



FIELD REFERENCE GUIDE
GENERIC HARVEST MODULE



HarvestMaster MLL

Field Research Software™

Generic Harvest Module

Reference Guide

A stylized, light gray background graphic featuring a corn cob and wheat stalks. The corn cob is positioned diagonally, showing its characteristic grid of kernels. Below it, several wheat stalks are depicted with their characteristic awns. The graphic is rendered in a clean, modern style with soft shadows and highlights, giving it a three-dimensional appearance.

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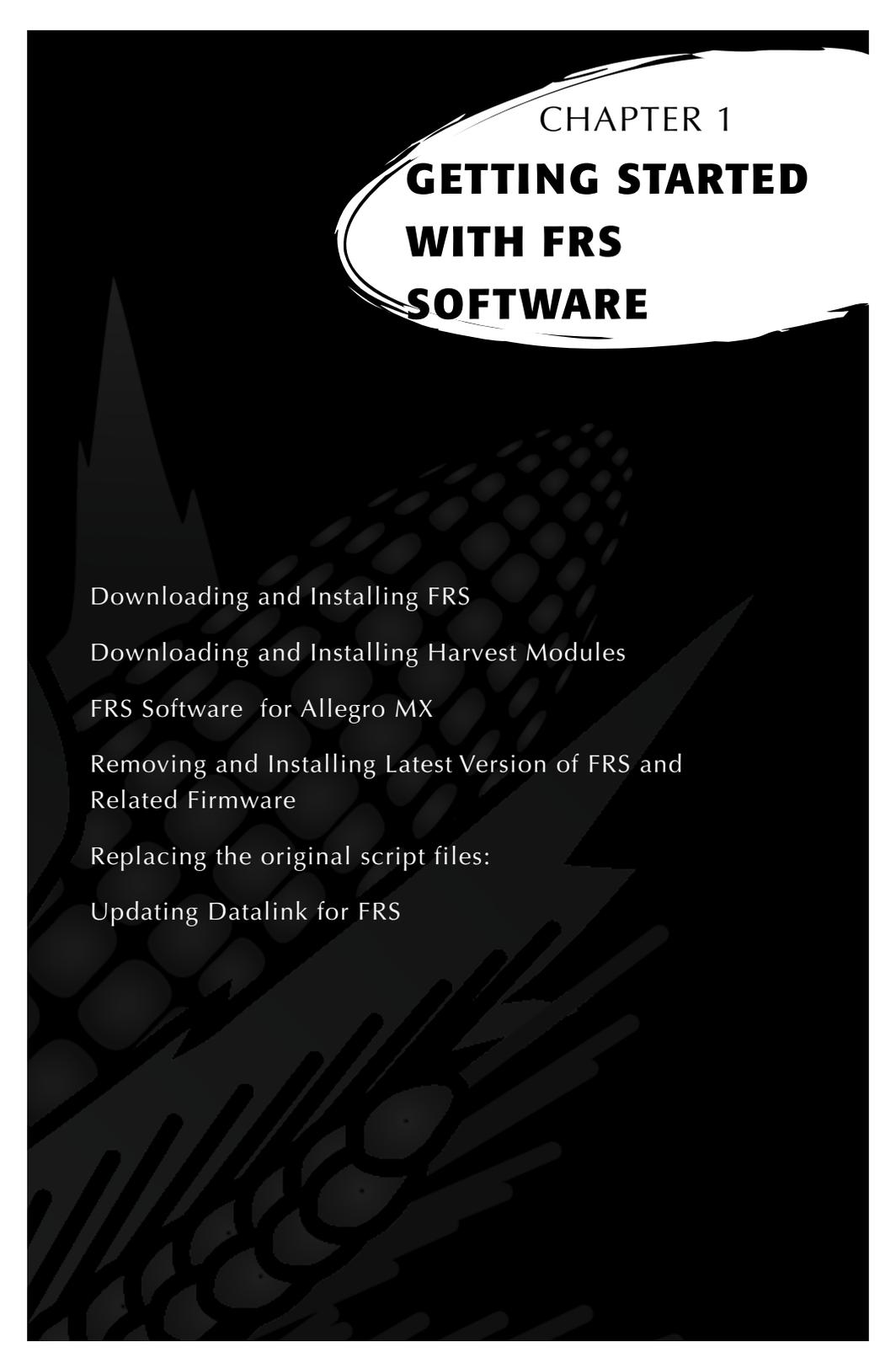
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CHAPTER 1
**GETTING STARTED
WITH FRS
SOFTWARE**

Downloading and Installing FRS

Downloading and Installing Harvest Modules

FRS Software for Allegro MX

Removing and Installing Latest Version of FRS and
Related Firmware

Replacing the original script files:

Updating Datalink for FRS

GETTING STARTED WITH FRS SOFTWARE

The Generic Harvest Module of the Field Research Software can be configured to work with a wide range of applications. It can be configured for standard forage type applications where no holding hopper is present and up to 3 load cells may be used. It is also used in two bucket grain systems with a holding hopper, a weight or plot bucket and a test chamber. With any of these applications, the number of load cells in use for the plot or weight bucket must be determined.

Designed by seed researchers, Field Research Software™ (FRS) helps seed researchers and agriculture scientists perform data collection tasks on research plots.

The Generic Harvest Module is employed on combines to record weight, moisture and test weight on grains or forages. It interfaces to a wide variety of buckets or measurement devices that make it adaptable to most any research combine or application. It aids research scientists by automating data collection. This Field Reference Guide helps you through the setup, calibration, and harvest with the FRS Generic Harvest Module.

This guide also outlines the operation of the Field Research Software Harvest module. The FRS Harvest module is a

component of the FRS Note Taking™ application. This Field Reference Guide assumes the user is familiar with the operation of FRS Note Taking. For more information, see the FRS Note Taking Field Reference Guide.

FRS software is designed so you can either tap on the touch screen with a stylus or use the keyboard. Function keys, arrow keys, the Enter key, and the Tab key are designed to help you move the cursor through the software and make selections.

Downloading and Installing FRS

1. Go to <http://www.harvestmaster.com/HarvestMaster/support/Downloads/FRS-Suite>.
2. Download FRS Note Taking, making sure you select the correct version of the software for your handheld OS (ex. CX vs. MX).
3. Make an Activesync (XP) or Mobile Device Center (Vista/Win 7) connection between your handheld and PC.
4. Run FRS Note Taking setup on PC.
5. Choose installation location on PC.
6. Choose “Yes” to allow program to install in default location on handheld.
7. Give it a minute or two to download onto your handheld.
8. Run FRS on handheld.
9. Enter name and previously obtained serial number and registration key.

Downloading and Installing Harvest Modules

1. Go to <http://www.harvestmaster.com/HarvestMaster/support/Downloads/FRS-Suite>.
2. Download CAB file associated with your harvest module and correct handheld OS (example: 400 vs. 800 and CX vs. MX).
3. Make an Activesync (XP) or Mobile Device Center (Vista/ Win 7) connection between your handheld and PC.
4. Click Explore (XP) / File Management (Vista/ Win 7).
5. Click and drag the CAB file from the PC to the handheld to a location that you can find later with File Explorer.
6. Allow file to convert to handheld format.
7. Run file on handheld.
8. Install to *Device*.

FRS Software for Allegro MX

Important notes

The process of updating FRS will erase all data associated with the current installation of FRS on the handheld. Please review the items in this section to understand which data is at risk and be sure to make backup copies so that you can restore files that are critical to your FRS setup. Please review the RELEASE NOTES associated with the latest software version located on the HarvestMaster website. These notes will recommend optimal settings and instructions to

maximize the efficiency of your Harvest Data System.

This update will:

- Remove all existing versions of FRS stored on your handheld.
- Remove the FRS database on the handheld. This includes field maps, customized trait list, trait templates, and other associated data. This data needs to be exported and saved so that they can be imported back into FRS after the new software is installed.
- Erase special harvest script files (GHM, Kincaid air diverter, Wintersteiger subsampler, etc.). These instructions will guide you through how to either download the latest script file or save your original script files and import them into the newest version of FRS.
- Erase the harvest calibrations and handheld settings, including load cell coefficients, chamber volumes, actuator settings, level detect sensor settings, timers, and moisture curves. In order to avoid having to recalibrate after the update, be sure to record the current harvest calibrations and handheld settings so that they can be entered in FRS after the update.

Requirements

- Original FRS Note Taking serial number and registration codes found on the back of CD case or laminated card sent at the time of purchase.
- Allegro MX Field PC
- Microsoft ActiveSync (for Windows XP) or Windows Mobile Device Center (for Windows Vista)
- Either a Power Dock (recommended) or a USB-to-mini-USB cable ActiveSync/Mobile Device Center connection to PC

Saving your original script file

1. Go to *Start > Programs > File Explorer*.
2. Go to *My Device > Program Files > FRS*.
3. Go into your Harvest Module's folder.



Figure 1-1: GHM script screen

4. Hold Ctrl on the handheld keyboard and tap once on the appropriate text files to high-light them.
5. Click *Menu > Edit > Copy*.
6. Go back to *My Device* and go to *Storage*.
7. Tap on *Menu > Edit > Paste*.

Removing and Installing Latest Version of FRS and Related Firmware

Removing FRS and Firmware on Handheld

1. Tap on *Start > Settings > System Tab*.
2. Scroll down and select *Remove Programs*.



Figure 1-2: Remove Programs icon

3. Choose to remove your Harvest Module.

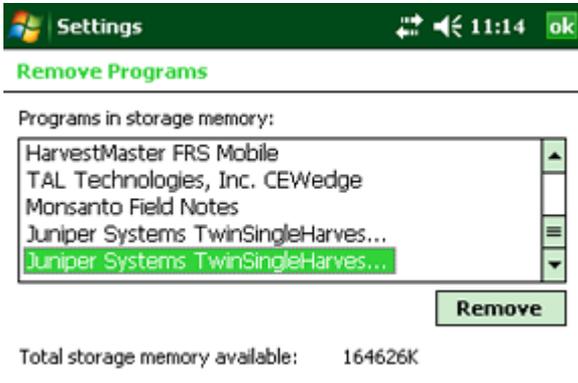


Figure 1-3: Remove Programs screen

4. Confirm your intention to remove the program.
5. Choose to remove FRS.
6. Confirm your intention to remove the program.
7. Choose to remove all application data.
8. Tap on **Start > File Explorer > Program Files**.
9. Scroll down and highlight FRS.



Figure 1-4: Highlight FRS

10. Click **Menu**, and delete FRS folder.
11. Choose **Yes** to whatever questions it asks about removing files.

Now you can download new software onto the handheld. Follow the instructions for downloading new software at the beginning of this chapter .

Replacing the original script files:

If there are no updated script files specified in the release notes, you can now copy/paste the original script files from the storage folder into the new harvest module folder. .

1. On the handheld, go to **Start > Programs > File Explorer**
2. Go to **My Device > Storage**
3. Hold Ctrl on the handheld's keyboard and click all the text files there.

Chapter 1

4. Click **Menu > Edit > Cut**
5. Go to **My Device > Program Files > FRS**
6. Go into your Harvest Module's folder
7. Click **Menu > Edit > Paste** and answer **Yes** when prompted.

If there are updated script files, download them from the website and paste them into your harvest module folder as previously instructed from steps five to seven.

HM-400 Users:

- If you are using an HM-400 system without a BDS test weight cup, you are ready to connect the handheld to the device. After a connection has been made to the Harvest Data System (HDS), the firmware or IOS on the HM-400 will automatically update. If your GrainGage has a BDS test weight cup, you must also update the firmware on the Hybrid module. See instructions below.
- You can key in your calibration settings that were previously copied down and verify the calibration and operation. If you never changed the transition timers on the actuators, we recommend leaving them at default to speed up operation.

Hybrid Module Firmware update:

1. Must also load HM-800 harvest module software for your appropriate handheld and harvest data system with BDS.

2. Connect Allegro via CAN-serial cable to a breakout box.
3. Unplug CAN cable from hybrid module and plug directly into breakout box.
4. Plug a short CAN cable from breakout box to the now open CAN port on the hybrid module.
5. Turn power on to the system and follow the steps outlined below to update the firmware on only the Hybrid module.

HM-800 Users:

- For HM-800 Systems, the firmware must be manually updated using a utility on the handheld. Follow the steps below to complete the HM-800 update.
- Using both the battery with a full charge and the external power cord is ideal before updating the firmware. Also make sure the auto suspend is disabled on the handheld. (**Start>Settings>System>Power>Advanced**) If you do not have an external power cord, you can use the Console charge cord. Failure to power the Allegro during the full firmware update process could lock the Console module.

Updating HM-800 Firmware

1. Connect handheld to HDS.
2. Select **Start > File Explorer > My Device > Program Files > FRS > Firmware.**

3. Run *HM-800 Updater*.



Figure 1-5: Select HM-800 Updater

4. Choose the file that contains the updated information.

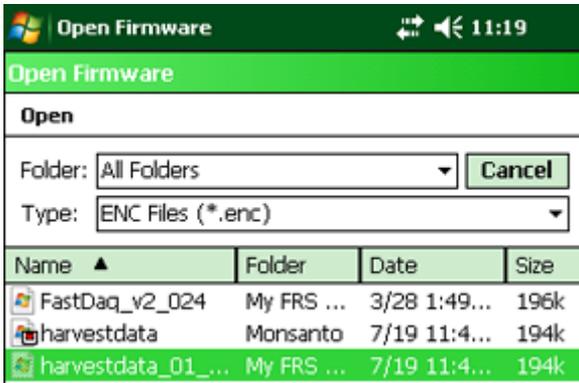


Figure 1-6: Select .enc file

5. Select the module you wish to update.

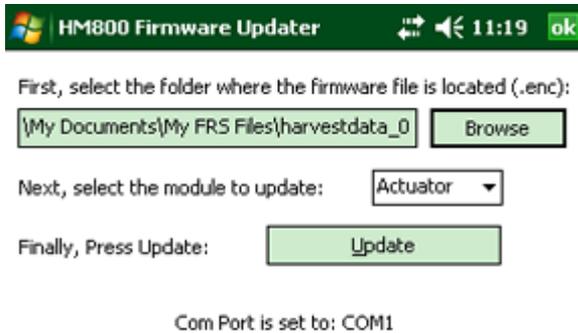


Figure 1-7: Select module to update

6. Click on **Update** and it will show the current firmware version installed and give you the option of continuing.
7. If the versions do not match and the current firmware version is older than the new firmware version, select **Yes**.

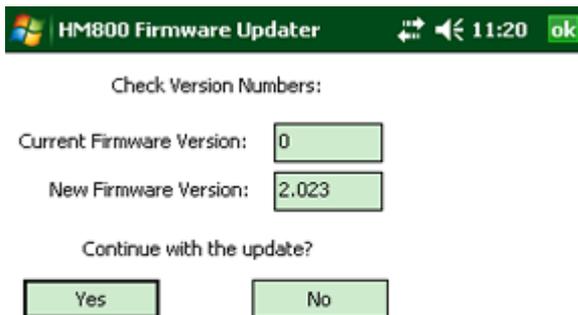


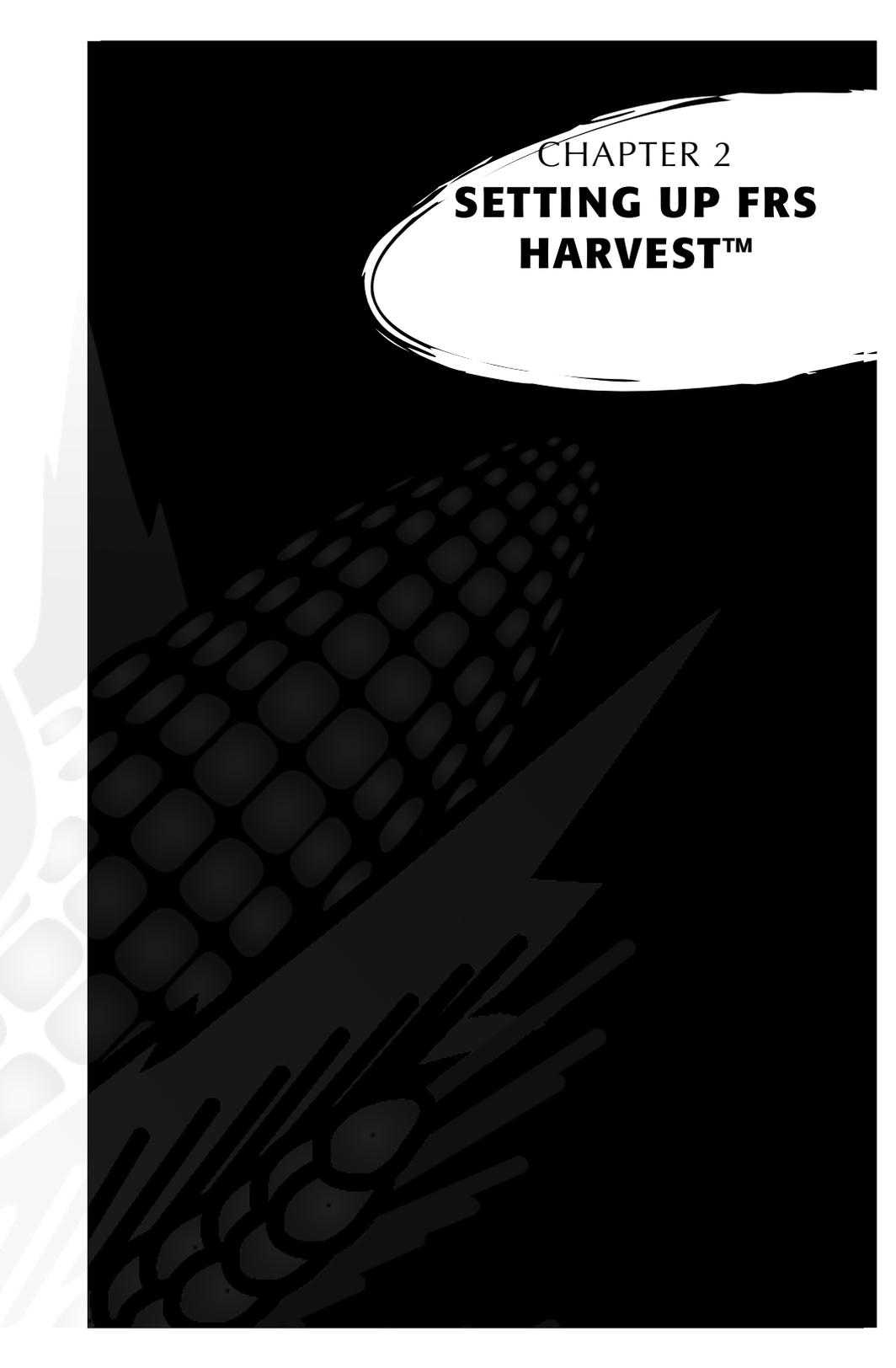
Figure 1-8: Select Yes to continue

8. Continue the firmware update for all HM-800 modules.

When the firmware update is complete, open FRS and type in your calibration settings that were previously recorded. If you never changed the transition timers on the actuators, we recommend leaving them at default to speed up operation. Verify the calibration and operation of the system. You will also need to import any data that you exported earlier such as maps, customized trait list, trait templates, existing data, etc. Refer to chapter 7 of the FRS Field Reference Guide: Note Taking manual for further instructions on importing and exporting files.

Updating Datalink for FRS

1. First, you will need to uninstall the original version of Datalink for FRS from your PC.
2. After uninstalling the original Datalink for FRS, visit <http://www.harvestmaster.com/updates> and download the latest version of Datalink for FRS.
3. Run and install this latest version and your Datalink for FRS will be updated and compatible with the latest FRS version.



CHAPTER 2
**SETTING UP FRS
HARVEST™**

Setting Up FRS *Harvest*™

Follow these steps to enable your Generic Harvest Module to work with FRS *Harvest*.

1. Make sure the cables between the control device and the handheld are set up properly so the software and hardware can communicate. For details about cable placement, see Appendix C: Cable Wiring for the HM-800.
2. From the Main FRS Screen, select **Setup** (F3).



Figure 2-1: Choose Setup on the Main FRS Screen

1. The setup menu appears. Tap on the plus sign [+] next to **System** or use the right arrow to expand the System option.

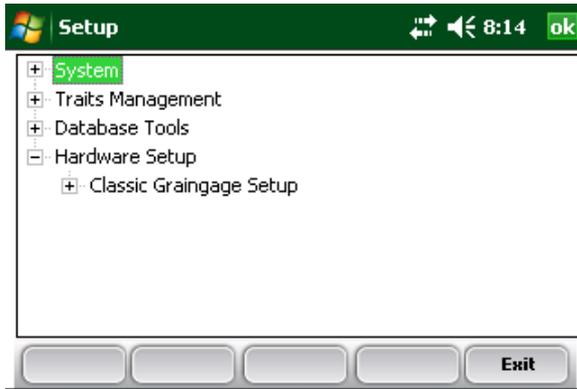


Figure 2-2: Setup menu

2. Select **Manage Devices** either by double-tapping it or by using the up or down arrow keys and pressing the Enter key.

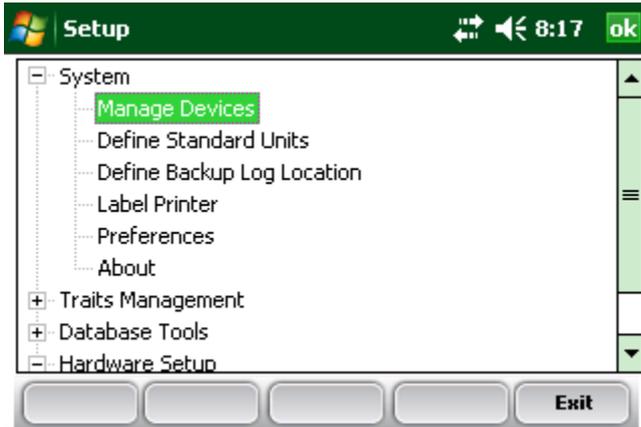


Figure 2-3: Setup menu with Manage Devices selected

Chapter 2

3. In the Devices screen shown below, enable the Generic Harvest Module by tapping on the appropriate check box. You can also highlight the desired module using the navigation arrows and press the spacebar to check the box.

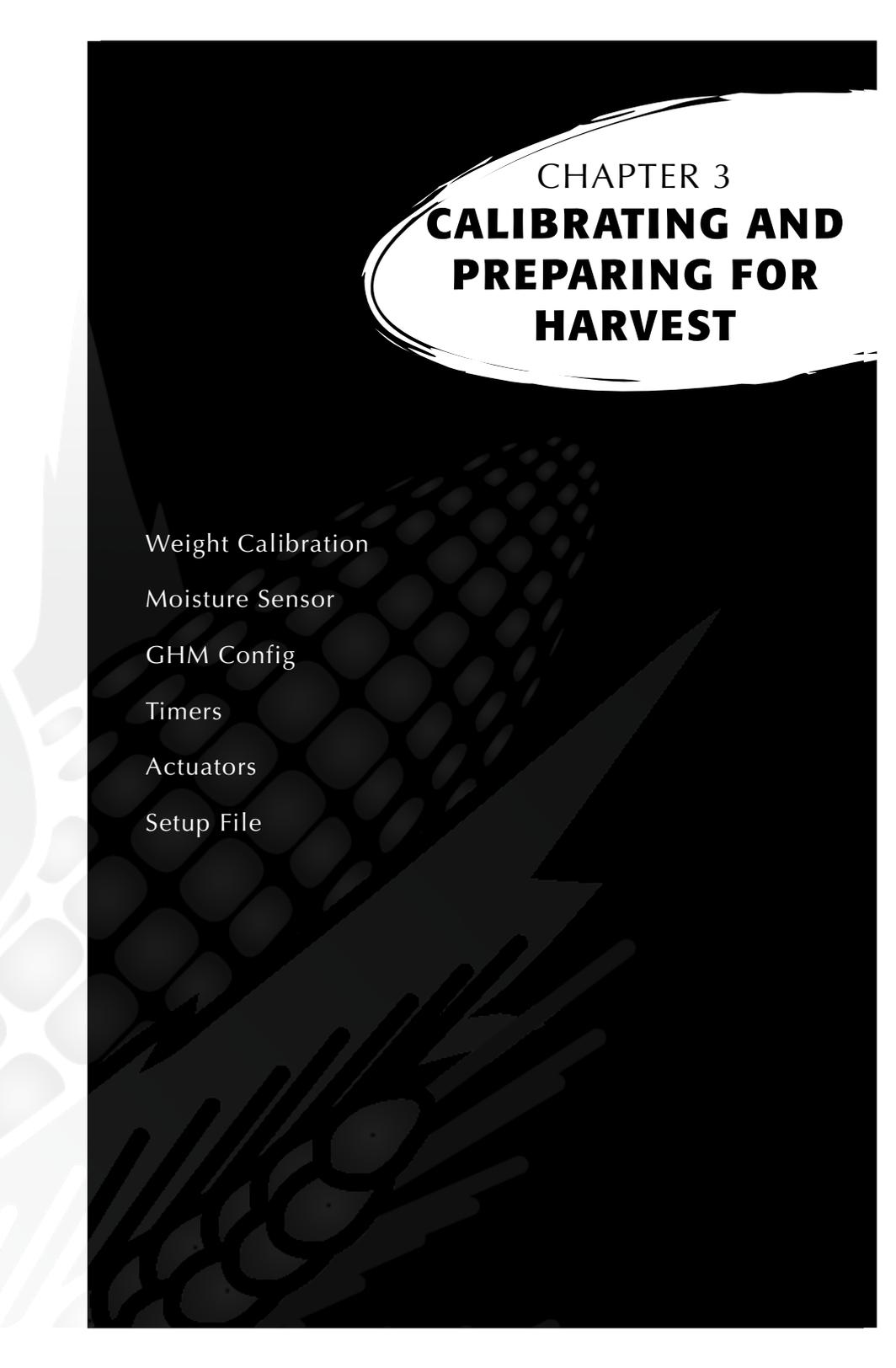
Note: Only one device can be enabled at a time.



Figure 2-4: Devices screen showing the Classic as enabled

4. Press **Save** (F4). The software begins to load and checks to see if hardware devices are connected. Wait until the software has finished loading before proceeding to the next chapter.
5. Press **Exit** (F5),

FRS software has an emulation mode to allow software familiarization without being connected to a hardware device.



CHAPTER 3
**CALIBRATING AND
PREPARING FOR
HARVEST**

Weight Calibration

Moisture Sensor

GHM Config

Timers

Actuators

Setup File

Calibrating and Preparing the System for Harvest

This chapter explains how to calibrate and set up your Generic Harvest Module to work with FRS Harvest. The sections below describe the first- and second-level menu options in the Setup menu under Generic Harvest Setup.

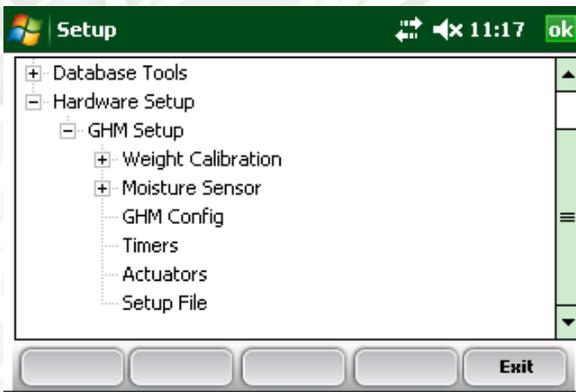


Figure 3-1: This chapter explains the options under GHM Setup in the Setup menu

Verify Weight Calibrations

In diagnostics select Load cell. Press F2 to tare the system. Place known weight(s) in the weigh bucket to total at least 10% of your system’s rated capacity (e.g., 20 lb for a 200 lb system). Record weight reading and, if different from known weight, follow the following steps to recalibrate weight reading.

Load Cell Calibration—Different Size and Single Load Cells

Before you can begin load cell calibration you must first determine the number of weigh or plot load cells being used by your system. Go to **Hardware Setup > GHM Setup > GHM Config**.

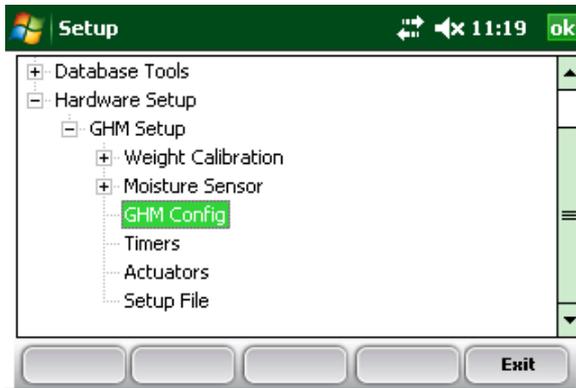


Figure 3-2: GHM Config

In the Generic Harvest Module Config screen, the user must specify the number of weigh or plot load cells in use.

In typical forage applications up to three load cells are installed. For standard grain buckets, one plot load cell is used. A hopper and test chamber may be used as well. If a separate load cell is used to measure test weight, the test chamber should be selected and a valid chamber volume determined.

The AutoTare feature is also used in forage applications.

With AutoTare enabled, the software will zero out the weight readings after each plot is harvested rather than emptying the bucket or belt.

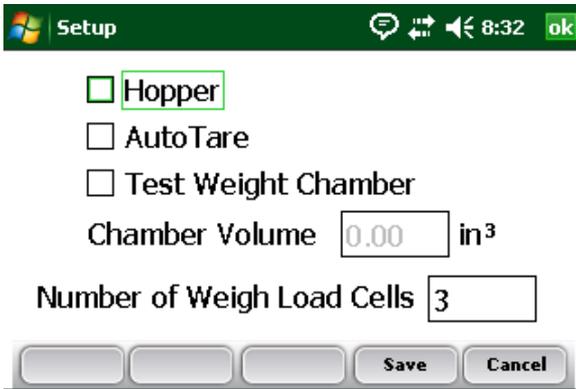


Figure 3-3: Generic Harvest Module Config screen

Manual calibration of multiple load cells can be accomplished by using one of two different methods. If you are using multiple load cells that are of the same size, skip to the section Load Cell Calibrating—Matching Load Cells. Single Load cells calibration should follow the procedure outlined below:

Load Cell Calibration—Different Load Cells.

After you have determined the number of load cells go to Diagnostics Load Cell screen on the main menu.

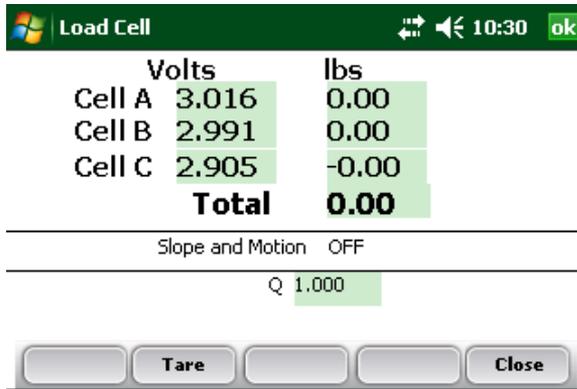


Figure 3-4: Diagnostics Load Cell screen

1. Select the units you wish to use by going to **Setup > System > Define Standard Units**. Select English or metric units.
2. From Diagnostics screen, place a known weight near load cell A. Write down the measured weight. Do the same for other load cells used in the system. Using the formula, below calculate the Cal Coef for each Load Cell

$$\text{Cal Weight Ratio} = \frac{\text{Actual Weight}}{\text{Measured Weight from Diagnostics}}$$

Example: 5.11 Actual / 4.80lb. measured = 1.0645833

3. To adjust load cell calibration, go to **Setup > GHM Setup > Weight Calibration > Edit Weight Calibration**. Up to three load cells can be calibrated and installed.

$$\text{Load Cell Cal Coef} = \text{Current Load Cell Cal Coef} * \text{Cal Weight Ratio}$$

1.0645933 * 11.35 Load Cell Cal Coef for Load A = 12.08

Repeat this same step for Load B and Load C

4.

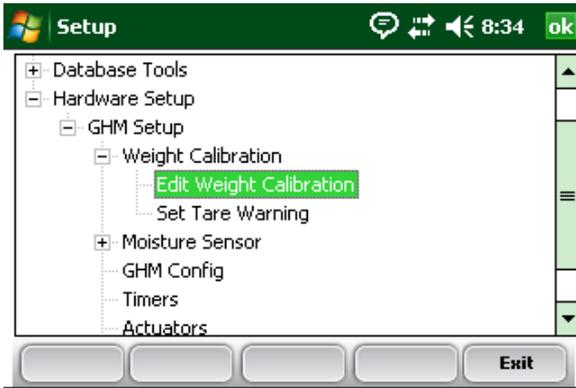


Figure 3-5: Edit Weight Calibration menu option

5. Type this New Cal Coef for all load cells into the correct text box and check in diagnostics.

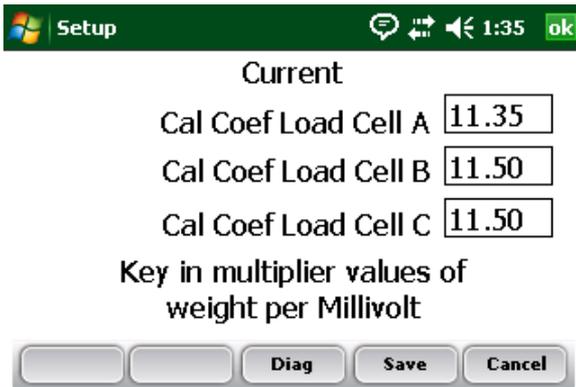


Figure 3-6: Edit Weight Calibration screen

6. Go back to the Edit Weight Calibration screen and press

F4 to save when you are satisfied with the measured weight.

Load Cell Calibration—Matching Load Cells

If all three load cells are of the same size, follow these steps for calibration. For load cells of different sizes, please refer to Load Cell Calibration—Different Load Cells

1. Make sure all Load Cell Cal Coefficients are set to the same value.
2. Go to the Diagnostics-Load Cell Screen.
3. Tare the bucket if it is not zero.
4. Place a known weight in the center of the weigh bucket
5. Write down the measured Total Weight
6. Use the formula below to calculate the Load Cell Cal Coefficients

$$\begin{aligned} &\text{Cal Weight Ratio} = \\ &\text{Actual Weight} / \text{Measured Weight from Diagnostics} \\ \text{Example: } &5.11 \text{ Actual} / 4.80\text{lb. measured} = 1.0645833 \end{aligned}$$

$$\begin{aligned} &\text{Load Cell Cal Coef} = \\ &\text{Current Load Cell Cal Coef} * \text{Cal Weight Ration} \\ &1.0645933 * 11.40 \text{ Load Cell Cal Coef for Load A} = 12.14 \end{aligned}$$

Type the New Cal Coef value into all three Load Cell Cal Coef in the Edit Weight Calibration Screen.

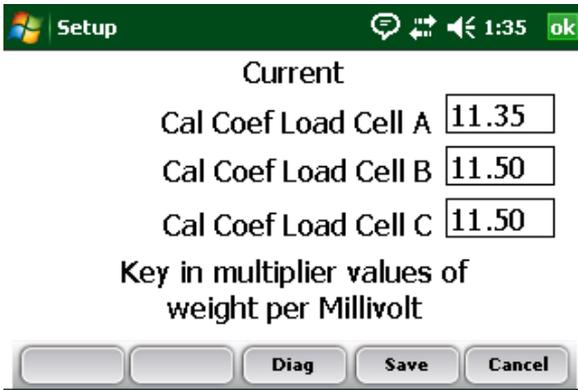


Figure 3-7: Edit Weight Calibration screen

Holding Hopper Function

The Generic Harvest Module of FRS can be used in multiple applications. If a holding hopper or cyclone is installed it acts as a holding area for grain being harvested while grain already harvested is in the weigh bucket.

If no hopper is present in the system as is the case with forage machines, the product drops directly into the weigh bucket. AutoTare can also be enabled for forage type applications. For details on configuring the hopper or AutoTare refer to the **Setup > GHM Setup > GHM Config screen**.

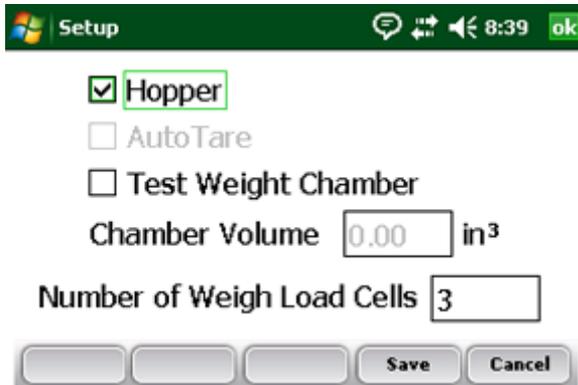


Figure 3-8: Generic Harvest Module Config screen

Moisture Sensor

The Generic Harvest system uses the EM Grain Moisture sensor for moisture. To view or modify the moisture curves select **Moisture Sensor: Moisture Curve**.

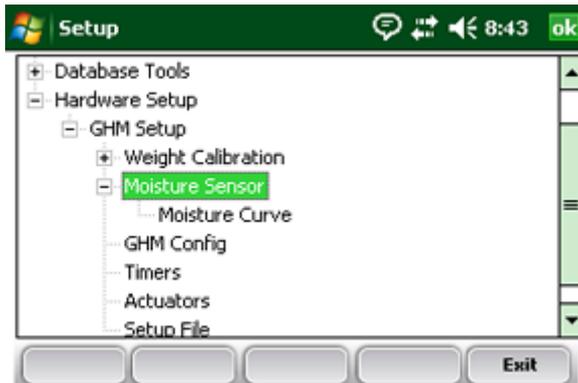


Figure 3-9: Setup screen with EM Sensor option selected

Moisture Curve

Editing a moisture curve

To edit a moisture curve, follow these steps.

Select **Setup** (F3), then choose **Hardware Setup** > **GHM** **Setup** > **Moisture Sensor** > **Moisture curve**.



Figure 3-10: Setup screen with Moisture Curve screen selected

The Moisture Curve screen appears, listing any existing moisture curves and giving you the option to edit, delete, or copy moisture curves. Each of these actions is described in more detail below.

Note: The check mark next to one of the curves indicates the curve most recently used.

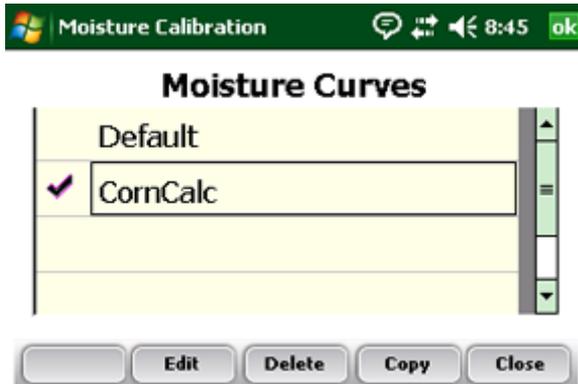


Figure 3-11: Moisture Calibration main screen

The Moisture Calibration screen lists all moisture curves that have been created. One of the curves is a **Default** grain moisture sensor curve that comes with FRS. It can be copied but not modified. The default curve consists of a set of known data points, which the system uses when making the moisture measurement on a sample of grain. When plotted in a spreadsheet, the default curve appears like the graph (see Figure 3-12).

Default Moisture Curve for EM Sensor

Moist %	MV
0.00%	0.00
10.00%	1.22
13.00%	1.61
16.00%	1.93
19.00%	2.19

22.00%	2.41
25.00%	2.60
28.00%	2.77
31.00%	2.93
34.00%	3.07
37.00%	3.19
40.00%	3.30

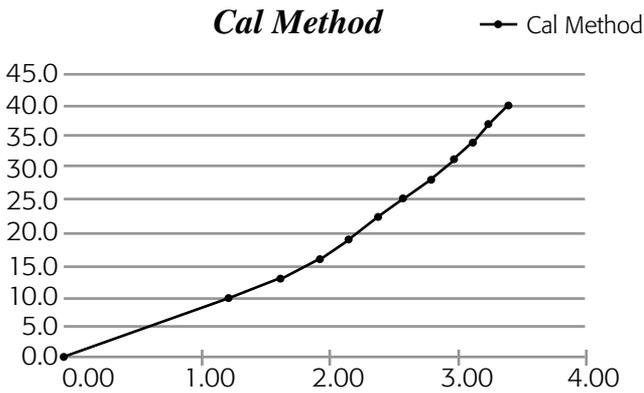


Figure 3-12: Default moisture curve as it appears in a spreadsheet (top) and as it appears in a graph (bottom)

To check moisture choose **Diags** (F4) on the main FRS screen then select **Moisture**. Record the Rel Vlt and the Moisture (%) from each sample that has been cycled through the grain gage. Compare the Moisture (%) reading with a known percent moisture from a standard.

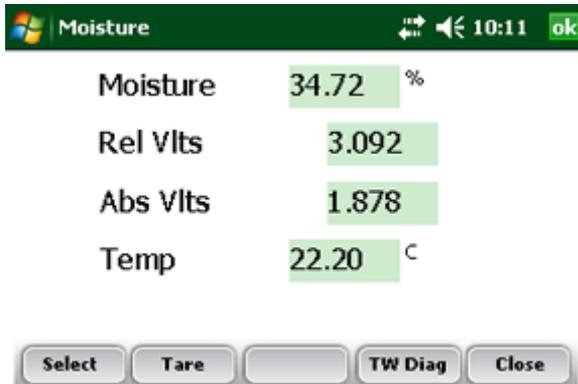


Figure 3-13: Diagnostics Moisture screen

Adjust the moisture curve by adjusting individual points in the curve. The following sections explain how to make adjustments to individual points.

Note: We recommend creating a different moisture curve for each different grain type. A custom spreadsheet to aid in adjusting your moisture calibration can be found on the Juniper Systems web site. This spreadsheet helps you adjust the points on the moisture curve to match your system.

To access the spreadsheet, go to **www.harvestmaster.com** and choose **Support > Knowledge Base > Generic Harvest > Moisture Sensor**. Choose the link called **HM-800 EM Sensor Moisture Curve Calculator (with suggested curves)** to view the spreadsheet.

Moisture Calibration/Adjustment

Before re-calibrating the moisture curve, it is important to note that a simple check of the EM sensor readings is all that may be required. Simply dump a few known samples through the system and verify the readings. If the readings are within specifications, no further calibration is needed. However, if the readings significantly differ from a bench top moisture analyzer, the following calibration may be necessary.

Two known samples at ambient temperatures will help start the calibration process. Test these samples on a bench top moisture analyzer and record the readings. A sample with a moisture range of 12-15% and a sample from 23-26% will perform the best with the EM sensor.

NOTE: Do not use “re-wet” or “water-added” samples for the calibration process. The physical characteristics of “re-wet” corn are significantly different than freshly harvested or naturally drying field corn and can adversely affect readings from the EM sensor. Storage of grain samples should be in unsealed containers to prevent the collection of surface moistures. It is also important to note that when you are dumping samples through the system, you cycle the grain through the system as it would during normal harvest conditions. For example, if there are holding hoppers present, use the holding hoppers to dump the grain into the system.

1. Navigate to the moisture diagnostics menu and record the temperature reading from an empty bucket.

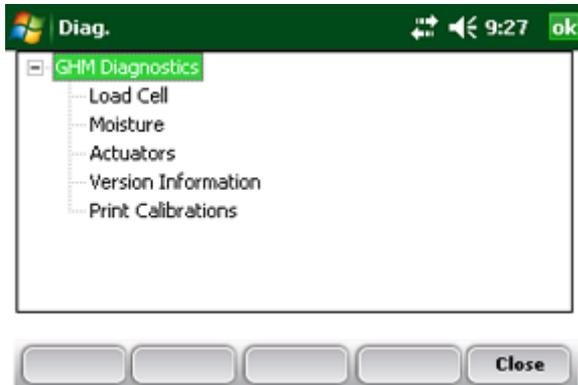


Figure 3-14: Diagnostics Menu screen

2. Dump the first sample into the system and record the REL volts.
3. Retrieve the first sample from the system for later use.
4. Dump the second grain sample into the system and record the REL volts for the second sample.
5. Retrieve second sample for later use.
6. Now that you have your readings from the HarvestMaster system, follow the instructions for the HarvestMaster moisture calibration spreadsheet located on our website at <http://www.harvestmaster.com/HarvestMaster/support/Knowledge-Base>.
7. Enter the moisture readings from your bench top moisture analyzer into the yellow column for moisture.
8. Enter the REL volts for both samples into the yellow column for volts.

9. Enter the temperature reading from the empty bucket into the yellow box for calibration temp.

Your new curve should now automatically generate. See **EM Grain Sensor Moisture Curve Calculator** following this section.

10. Once the new curve has been generated, create a new moisture curve in FRS and enter your Curve Name and the values from the spreadsheet (**Setup>GHMSetup>MoistureCurve**).

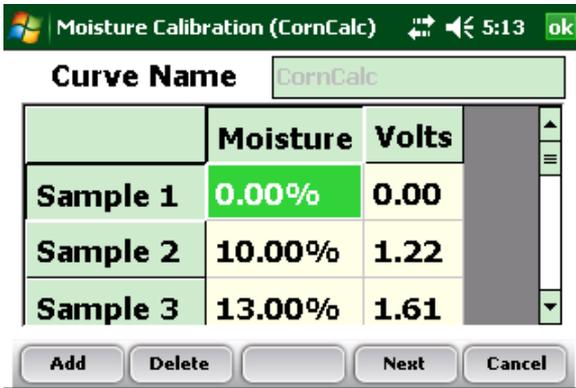


Figure 3-15: Moisture curve view

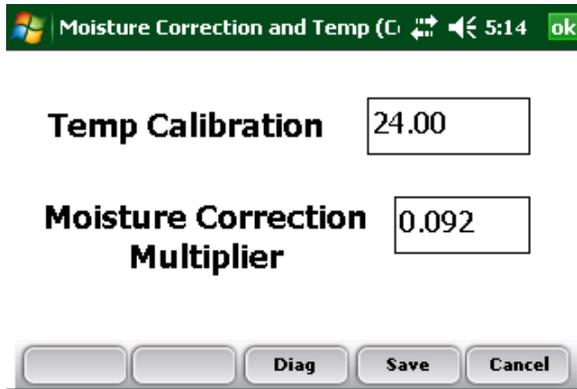


Figure 3-16: Temp compensation screen.

11. Save the new curve. Dump the samples back through the system to verify the readings. We also suggest dumping three to five samples of different moistures to verify readings throughout a moisture range that you may encounter during harvest. You have now successfully calibrated your EM sensor!

EM Grain Sensor Moisture Curve Calculator

Instructions:

1. In the grain moisture diagnostics screen, with an empty chamber, activate the tare process.
2. Cycle a known moisture DRY grain sample (e.g. 12% to 15% for corn) into the moisture sensor chamber. Write down the known moisture value, Temp value, AND the “Rel Vlt” value. DO NOT use empty chamber readings for these values.
3. Cycle a wet grain sample (e.g. 23% to 26% for corn)

Chapter 3

into the moisture sensor chamber. Write down the known moisture value and the “Rel VIts” value for the wet sample.

4. Into this spread sheet, enter the readings for the dry grain sample opposite the label “Dry Sample.” Enter the readings for the wet grain sample opposite the label “Wet Sample.”
5. After entering these values, the table of ordered pairs will be adjusted to match the two given points.
6. In the setup menu of the harvest data software, enter the values of the table below for the grain moisture sensor calibration curve.
7. Press F4 Next to go to the Moisture Correction and Temp screen. Enter the temperature recorded when you ran the samples through the system.
8. Press F4 to Save.

Note: Unhiding lines 22 to 25 on the spreadsheet shows the equations that calculate the logarithmic fit characteristic of the EM Grain Sensor output with respect to grain moisture.

	% Moisture	“Rel Vlts”	
Dry Sample:	13.0	1.267	Dry Sample readings
Wet Sample:	25.0	2.550	Wet Sample readings
Generated Curve:			Cal Temp: 21.5
	10.0	0.752	
	13.0	1.267	
	16.0	1.674	
	19.0	2.012	
	22.0	2.299	
	25.0	2.550	
	28.0	2.772	
	31.0	2.972	
	34.0	3.153	
	37.0	3.319	
	40.0	3.472	

Table 3-1: Sample EM sensor moisture curve data points

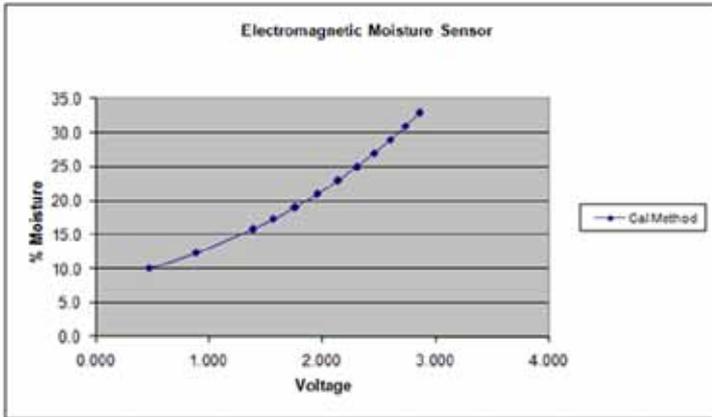


Figure 3-17: EM Sensor moisture curve

Fine Tuning Moisture Curves

If any adjustment is needed to the curve, you can easily adjust the moistures up or down in the curve. First, verify the moistures high or low that the EM sensor is reading and adjust the moistures in the opposite direction in the table of the curve. The example below will clarify this procedure. (Actual moistures and voltage you experience may differ from below.)

In the example below, the EM sensor was reading 1% high, therefore you can adjust the moisture percentages in your curve down by 1%.

Sample 1 = 13.5 % EM reading=14.5%

Sample 2 = 25% EM reading= 26%

Adjusted Moisture	Moisture	Volts
0	0	0
9	10	1.22
12	13	1.61
15	16	1.93
18	19	2.19
21	22	2.41
24	25	2.61
26	27	2.77
28	29	2.93
31	32	3.07
34	35	3.19
37	38	3.3

Table 3-2: Moisture Curve Points

Deleting a Curve

The **Delete** option in the Moisture Curve menu allows you to remove unwanted moisture curves. To delete an unwanted moisture curve, follow these steps:

1. Select the curve you want to delete and press **Delete** (F3).

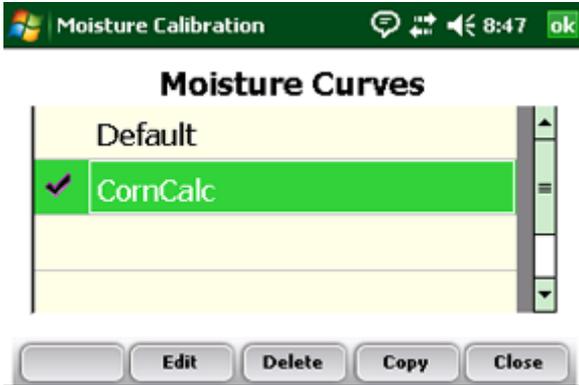


Figure 3-18: Delete a moisture curve by selecting it and tapping Delete (F3)

2. Confirm the delete by tapping Yes or No.

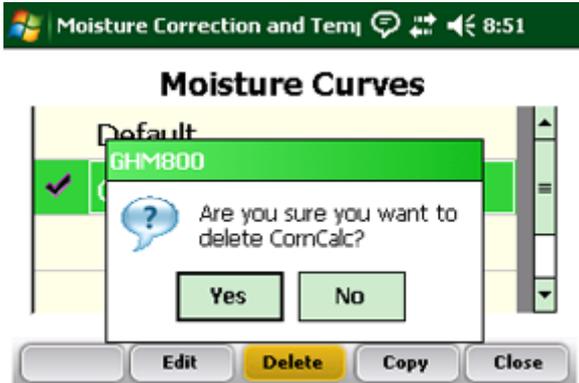


Figure 3-19: Warning screen

Copying a Curve

The Default Moisture cannot be modified. To make changes to this curve you must first make a copy of it. Follow these steps to copy a curve:

1. Select the moisture curve you want to copy or rename and then press **Copy** (F4).
2. Type in the new name of the moisture curve, make any desired changes, then press **Next** (F4).
3. Press **Save** (F4) to save the file and exit the screen.

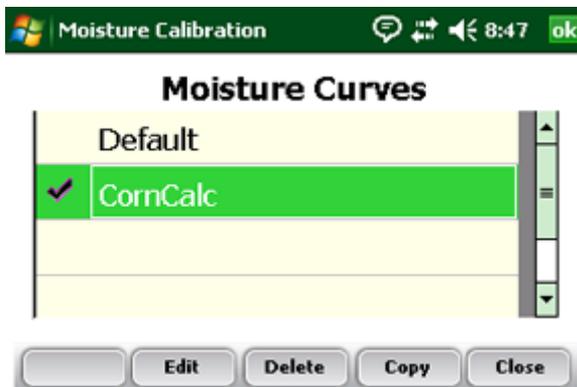


Figure 3-20: Copy a moisture curve by selecting it and tapping Copy (F4)

GHM Config Screen

The GHM Config screen has settings that distinguish the Generic Harvest Module from standard bucket applications and forage or multiple load cell applications.

Choose **Setup** (F3) on the main FRS screen, then select Hardware **Setup** > **GHM Setup** > **GHM Config**.

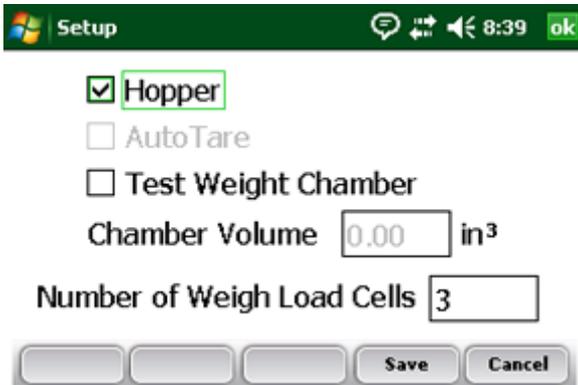


Figure 3-21: Generic Harvest Module Config screen

Check Hopper when a hopper or cyclone is present. This changes the sequencing of buckets in harvest.

Check the AutoTare box in forage applications where the bucket will be tared or set to zero after each plot instead of emptying the bucket if desired.

Test Weight Chamber Volume

In a standard two bucket system, a chamber or bucket may be used to determine test weight. To view or change the test weight chamber volume follow these steps:

1. Choose **Setup** (F3) on the main FRS screen, then select Hardware **Setup > GHM Setup > GHM Config**.
2. The test weight volume can vary from bucket to bucket. It is important to determine the volume in Cubic Inches or Cubic Centimeters of the test chamber in order to have accurate test weight.

3. To verify test weight accuracy, take a grain sample and verify test weight from a known test weight measurement device. Cycle the grain sample through the system to get a measured test weight. If the test weight measured by the bucket does not match the test weight from a standard, the chamber volume can be adjusted.
4. To adjust the test weight reading from the system use the following formula

**New Chamber Volume =
measure test weight/actual test weight * chamber volume**

Example: 56.2 lb./bu / 58.8 * 89 = 85 cu inches.

5. Type the new test weight chamber volume into the text box. For metric conversion the test chamber and test weight should be in cu cm and kg./hl.

Timers

The Timer screen is used to adjust various timers used with the system. Each of these timers can be adjusted using the Timer Setup screen, which is available by choosing **Setup** (F3) from the main FRS screen then tapping **Setup > GHM Setup > Timers**.



Figure 3-22: Timer Setup screen

- **Hopper Open.** The amount of time the hopper door remains open before beginning the close process.
Note: 1.00 = 1 second.
- **Plot Open.** The amount of time the plot door stays open before starting the close process

Note: We recommend that you do not set the open times less than one second

- **Settle time.** The amount of time that the grain is allowed to settle in the plot bucket after the preceding gate closes before it starts weighing the grain
- **Weigh time.** The amount of time data is collected and averaged to determine the actual weight reading
- **CountDown timer.** The amount of time from when the enter key is pressed until the system starts to cycle.
Usually equal to the time it takes for the combine to clean

out or the time it takes for the grain to travel from the head of the combine to the hoppers. Note: 1.00 = 1 second.

Actuators

The Actuator Setup screen is used to select the appropriate type of actuator and transition times for your system. To access the screen, choose **Setup** (F3) on the main FRS screen then tap **Hardware Setup > GHM Setup > Actuators**.



Figure 3-23: Double-tap Actuators from the Setup menu to access the Actuator Setup screen

Once you see the Actuator Setup screen, select the appropriate actuator type from the drop-down menu for each actuator.

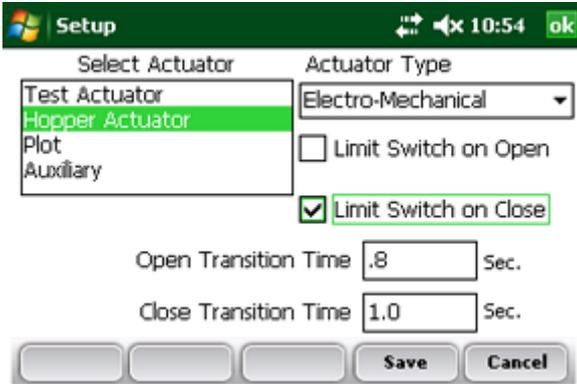


Figure 3-24: Actuator Setup screen

If limit switches are being used, check the boxes accordingly. If limit switches are not being used, enter the time in seconds needed for the stroke of the actuator to fully extend or retract. In the example above, the limit switch is enabled for the Hopper (top) on the closing transition only. On the opening transition, a time of 0.8 seconds controls the actuator.

Setup File

The **Setup File** option on the Setup menu is a way to establish specific settings for a specific machine. This is helpful if you want to use your handheld with more than one combine. The steps below explain how to establish setup files for two combines.

1. Set up and calibrate one combine.
2. Enter the Setup File screen by double-tapping **Setup File** in the Setup menu. A list of existing setup files appears.

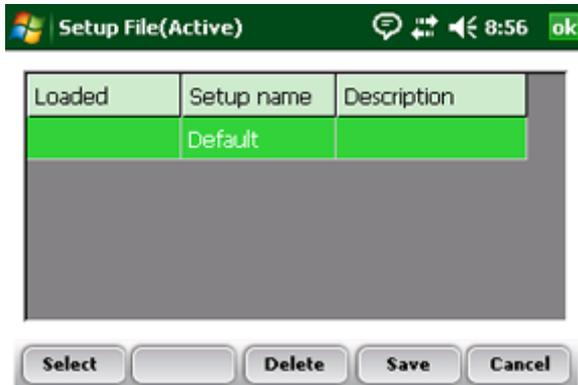


Figure 3-25: Setup files that appear by default

By default, the settings you created when you set up and calibrated the handheld were saved to the Default setup file.

3. To create a setup file for a second combine, tap **Save** (F4)

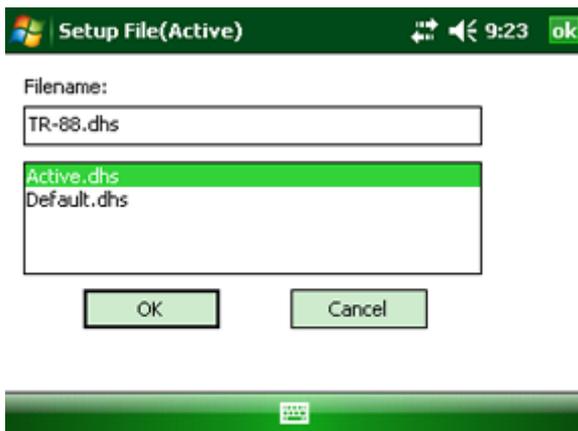


Figure 3-26: Naming a new setup file

4. Create a name for the second setup file.
5. Repeat steps 1–2. The new setup file appears.

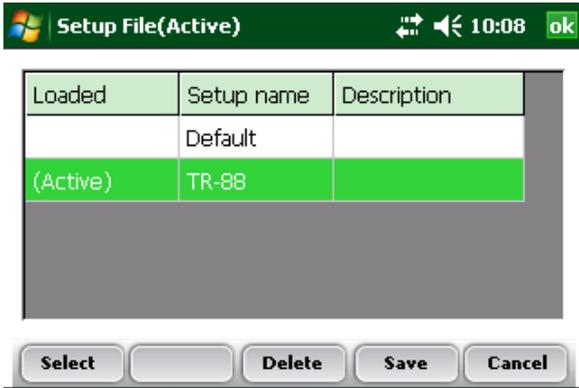
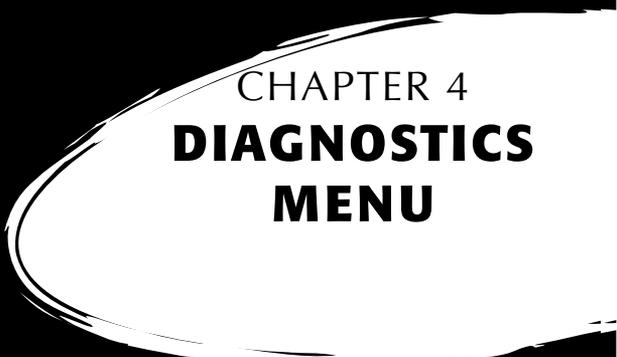


Figure 3-27: The new setup file appears

6. As you can see in the first column, this second setup file is now the active file, which means that any setting and calibrations changes you make are automatically saved to that file. To make another setup file active, select it then tap **Select**.

To create setup files for additional machines, repeat the process.



CHAPTER 4
DIAGNOSTICS
MENU

Load Cell

Moisture

Actuators

Print Calibrations

Diagnostics Menu

The Diagnostics menu is designed to help you troubleshoot and test your hardware. To access this option, select **Diag.** (F4) from the main FRS screen. Four submenu options appear on the Diagnostics Menu page, shown in the following image. Each option is described below.

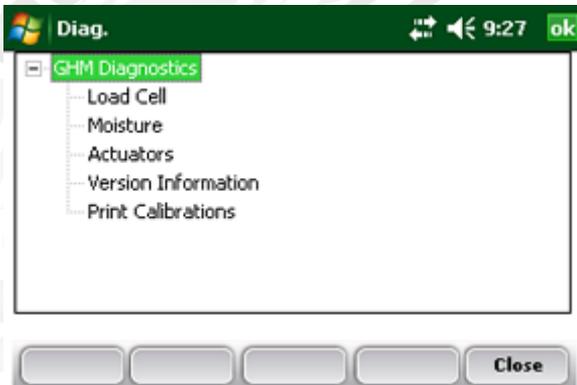


Figure 4-1: Diagnostics Menu screen

Load Cell

Checking the calibration

You can check the calibration of the load cell using the options on the Diagnostics Menu screen. Before you do that, however, first check the accuracy of your calibrations by ensuring that—

- The combine is on level ground and out of the wind
- The weigh bucket is empty
- The calibration weight is close to harvest weight

Follow these steps to check your load cell calibration:

1. From the Diagnostics Menu, double-tap **Load Cell**. The Diagnostics Load Cell screen appears, shown here

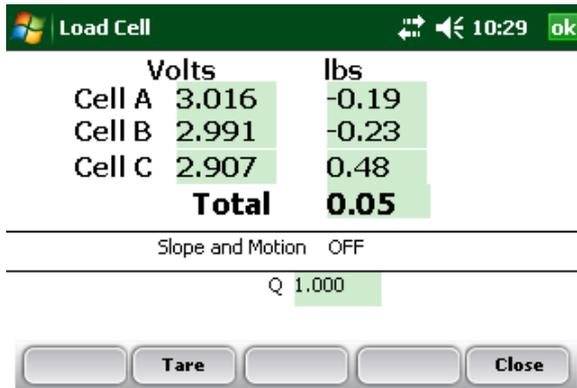


Figure 4-2: Diagnostics Load Cell screen

2. Make sure the weight values for Cell A, Cell B, Cell C and the total weight all equal close to zero. If not, tare the system by selecting **Tare** (F2).

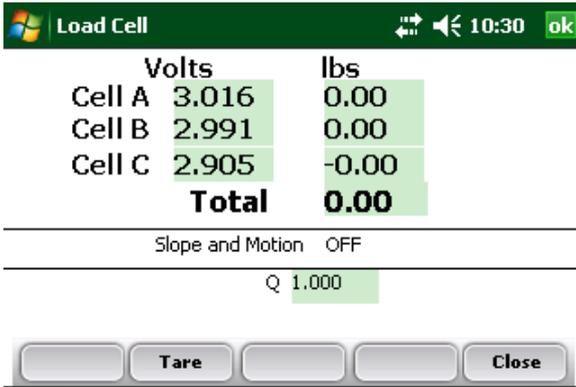


Figure 4-3: Weight values for Cell A, Cell B, Cell C and Total change after a tare

3. Place your known weight into weigh bucket.
4. The weight shown in the Total line should match your known weight. If the weight is incorrect, recalibrate the load cells by returning to the main FRS page and selecting **Setup > Hardware Setup > GHM Setup > Weight Calibration**.

Moisture

The Moisture option allows you to view readings associated with the EM Grain Moisture sensor.

To view the Diagnostics Moisture screen, select **Moisture** from the Diagnostics menu. The following information is displayed.

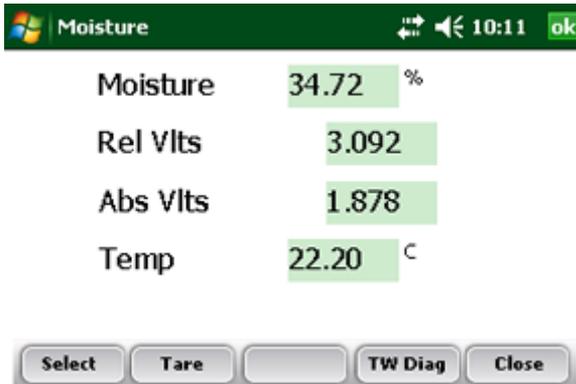


Figure 4-5: Diagnostics Moisture screen

Moisture

The percentage of moisture read by the moisture sensor.

Abs Vlts (Absolute Volts)

The raw voltage reading from the moisture sensor.

Rel Vlts (Relative Volts)

The tared-out voltage reading of the moisture sensor.

Temp (Temperature)

The temperature read from the moisture sensor.

Tare (F2)

To retare the moisture reading, select **Tare** (F2).

Select (F1)

Tapping this soft key opens the moisture curve menu screen, allowing you to select a moisture curve to be used for checking calibration. Select the curve and then tap **Select (F1)** again to return to the previous screen.

LED Codes on the EM Grain Moisture Sensor

Green, yellow, and red LED's (light emitting diode) are designed into the sensor for service and diagnostics purposes. These LED's can be viewed by looking at the right side of the white plastic housing of the sensor. The function of the LED's are described as follows.

Green: On solid when +12 VDC is applied to the sensor

Yellow: Blinks whenever a message is transmitted from the sensor such as when the application software is in the moisture diagnostics menu.

Red: Indicates sensor error conditions. With no error codes, the red alternates one second on, then one second off.

Any error codes are represented by pairs of 'rapid blinking', the number of blinks corresponding to the first and second digit of an error code from the list below:

- 11. Watchdog reset has occurred
- 12. Timed Task Buffer overflow detected
- 13. Low memory alert ($M < 50$ bytes)
- 21. Input buffer overrun

- 22. Checksum error detected
- 23. Unrecognized command received by sensor
- 24. RS-485 busy encountered
- 25. Sensor response message aborted
- 32. Frequency measurement zero error (no oscillation counts)
- 33. Frequency measurement range error (over 3 Mhz)
- 41. Blade voltage range error
- 42. Temperature sensor zero error (reading at or below -15 C (5 F))
- 43. Temperature sensor range error (reading above $+60$ C)
- 44. System supply voltage below $+10.0$ Volts
- 45. System voltage above $+18.0$ Volts
- 55. Invalid error code reported

When the sensor is operating normally, no error codes should show. There should just be a steady one second on, one second off blink of the red. Otherwise, general interpretation would be:

- 11, 12, 13, 55: Software system problems. Report to customer service and design engineering with description of circumstances.
- 21, 22, 23, 24, 25: Faulty sensor wires, or faulty SCCU. These could be caused by some fault within the EMGS, but it is not likely.

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- 32, 33, 41: Likely cause would be a bad connection from the sensor to the ground plane around the blade, or from the sensor board to the blade.
- 42, 43: Assuming the temperature is in a normal ambient range from -10 C to +40 C, these codes would indicate a failed temperature sensor, or board solder connection.
- 44,45: These are more likely caused by a problem in the power supplied to the EMGS.

Actuators

This Actuator Controls screen allows you to open, close, or cycle any or all of the actuators. To access this screen, select **Diag.** (F4) from the main FRS screen, then select **Actuator.** The Actuator Controls screen appears.

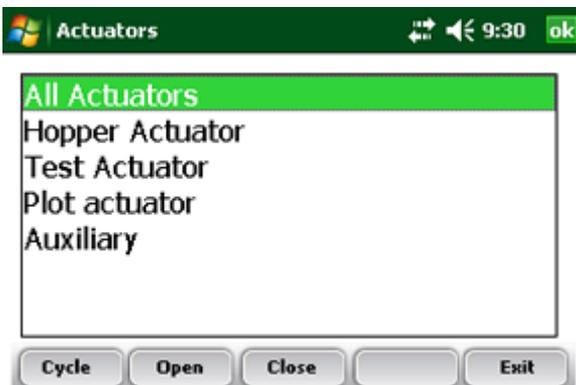


Figure 4-8: Actuator Controls screen

Print Calibrations

The Print Calibrations menu allows you to print your calibration settings. To print, simply select one of the calibration options and tap **Print** (F1).

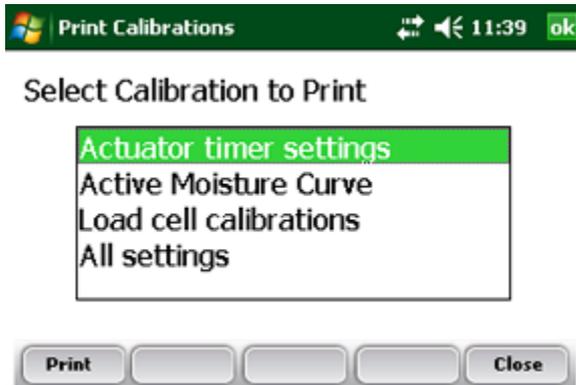
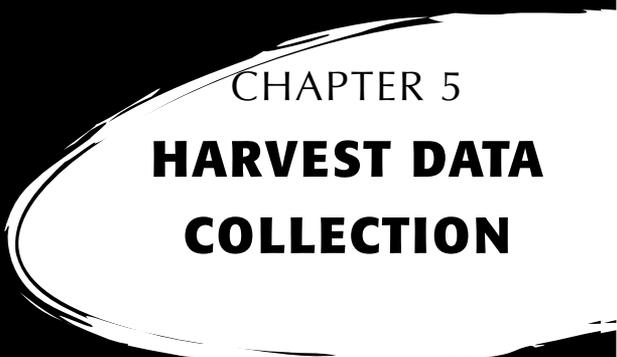


Figure 4-9: Print Calibrations screen



CHAPTER 5
**HARVEST DATA
COLLECTION**

Preparing to collect harvest data

Harvesting and collecting data

Viewing your harvest data using the List Screen

Harvest Data Collection

After you have calibrated the Generic Harvest Module, created harvest traits, and created a new harvest trait template, you are now ready to collect data. This chapter explains how to prepare for, collect, and view harvest data using FRS. For additional information, refer to the *FRS Field Reference Guide (Note Taking)*.

Preparing to collect harvest data

Follow these steps to prepare FRS to collect harvest data:

1. On the FRS Main Screen, make sure the Active Devices box shows GHM in the Setup menu under *System > Manage Devices*.



Figure 5-1: The Generic Harvest Module appears in the Active Devices box

2. Select the appropriate activity from the Activity drop-down menu on the FRS Main Screen. For example, if you plan to use FRS for harvesting, select the **Harvest** Activity. For standard plot lengths, set the activity to Harvest-Plot.
3. On this same screen, select the correct field map name from the pull down menu.

Note: If you need a new field map for harvest, create one before proceeding to the next step. Refer to the FRS Note Taking Field Reference Guide (Note Taking) manual for instructions on creating a new field map.

4. Select the trait template you want to use from the Trait Template drop-down box. Options include the harvest traits you created such as Weight, Moisture or Test Weight.
5. Select **Collect** (F1) to enter data collection mode. The Moisture Calibration screen appears.

Note: If a moisture is not included in the Trait Template or is being recorded, this screen does not appear.

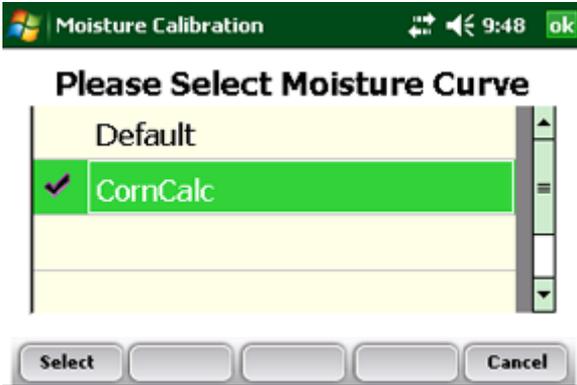


Figure 5-2: Moisture Calibration screen

6. Select a moisture curve from the list, then tap **Select** (F1). Wait while harvest set ups are loaded.
7. The Collect Data Spatial screen appears, shown below.

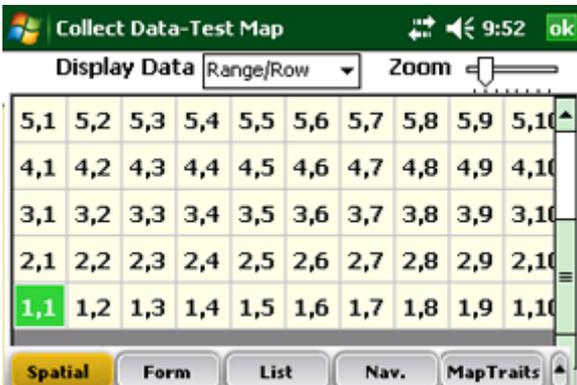


Figure 5-3: Row 1, Range 5 is selected in the Collect Data Spatial screen

8. Choose the starting plot location by tapping on the cell. In Figure 5-3, the selected cell is Range 1, Row 1. After

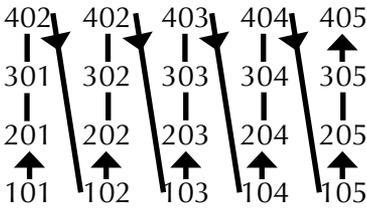


Figure 5-6: Sequential navigation type

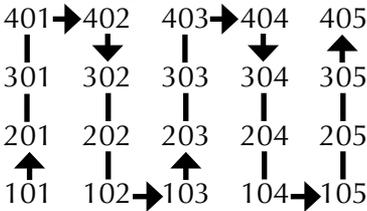


Figure 5-7: Serpentine navigation type

Tap **Save** (F4) to save your settings.

Harvest Sequence—with Hopper

From the main FRS menu, make sure the Activity selected in the drop down menu is Plot Harvest. Select the desired harvest map and select the Trait Template from the drop down menu.

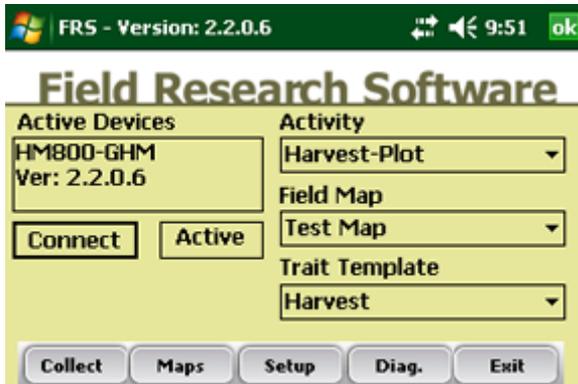


Figure 5-8: Main screen

To start harvest, press the **Collect** button on the main screen and wait for the harvest sequence to be initialized. Select the starting range and row from the Spatial screen.

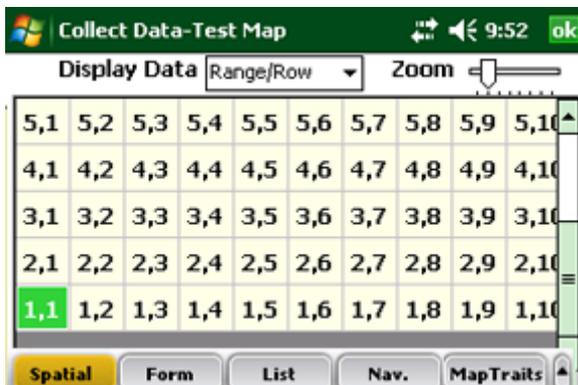


Figure 5-9: Collect data screen on spatial tab

1. To begin harvest, line up starting plot with the combine and harvest the first plot.
2. As soon as the head has cleared through the first plot, press the Enter Key. If a countdown timer is used it

begins counting down. (The Countdown timer can be adjusted in *Setup > GHM Setup > Timers*)

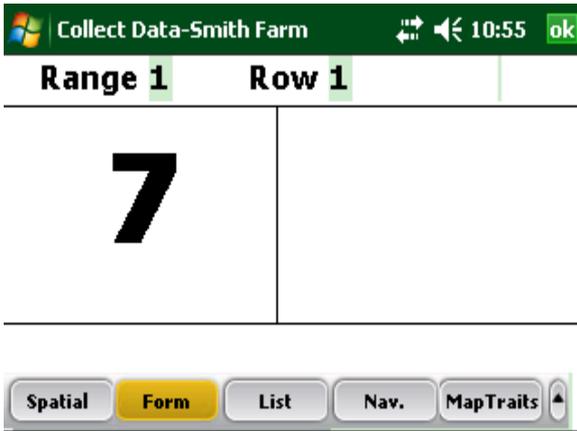


Figure 5-10: Countdown timer

3. The Hopper door will open when the Enter key is pressed emptying its contents into the weigh bucket.
4. The driver should harvest the second plot letting it fill up the holding hopper. As soon as all grain is in the holding hopper the Enter key is pressed again.
5. The traits that have been enabled will be taken on the grain in the weigh bucket.

Collect Data-Smith Farm		10:58	ok
Range 3		Row 1	
Weight	5.34		
Moisture	10.38		
Tstwgth	64.31		
W: 0.01	M: 0.01		
Spatial	Form	List	Nav. MapTraits

Figure 5-11: All three traits collected

6. After the plot bucket door empties out, the hopper will open emptying its contents into the weight bucket.
7. The driver can start into the next plot and the sequence starts again.

Harvest Sequence—with No Hopper

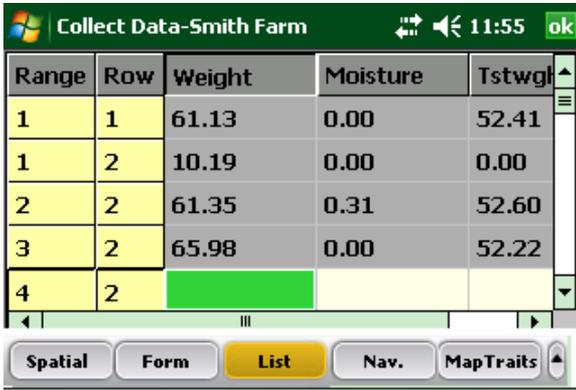
If a hopper is not enabled product is taken directly to the plot or weigh bucket. Data are recorded in the plot bucket after the Enter key is pressed rather than filling into the hopper.

In applications where no hopper is present such as on forage machines.

AutoTare feature may be enabled. To set the AutoTare feature go **Setup > Hardware Setup > GHM Setup > GHM Config.**

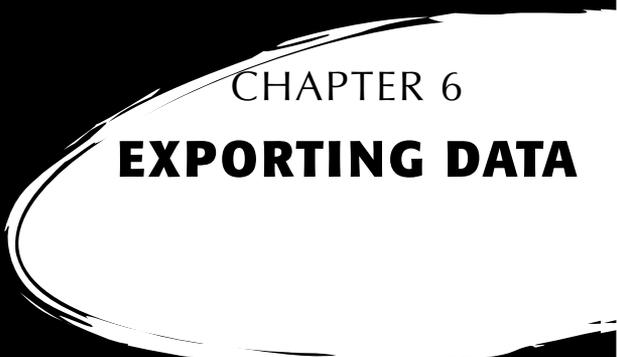
Viewing your harvest data using the List Screen

By selecting **List** (F3), you can view your harvest data. Note: You CANNOT collect harvest data while you are in this screen. To harvest, you must be in the Form screen. See the section above called **Plot Harvest Sequence** for details.



Range	Row	Weight	Moisture	Tstwtg
1	1	61.13	0.00	52.41
1	2	10.19	0.00	0.00
2	2	61.35	0.31	52.60
3	2	65.98	0.00	52.22
4	2			

Figure 5-12: List screen showing moisture, test weight, and weight values for each plot



CHAPTER 6

EXPORTING DATA

Extracting collected data

Backup Log for Harvest Modules

Exporting Data

Extracting collected data

The first step in exporting data is to extract collected data from the FRS database to the Export folder on the handheld. To extract data, follow these steps:

1. Tap **Setup** on the main FRS screen to enter the Setup screen.



Figure 6-1: Select Setup from the main FRS screen

2. Choose **Database Tools** > **Export data** to CSV from the Setup menu.

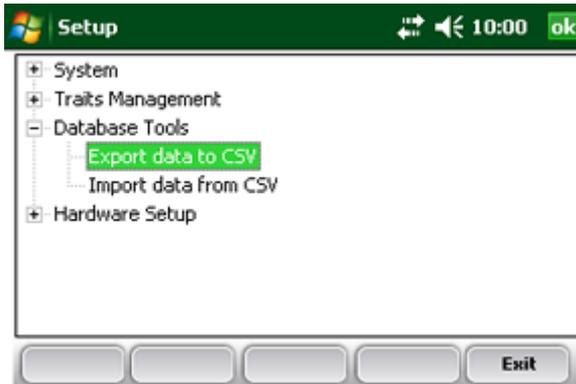


Figure 6-2: Choose Export data to CSV from the Setup menu

3. The Import/Export Utility screen appears. Select **Export from FRS Database**.

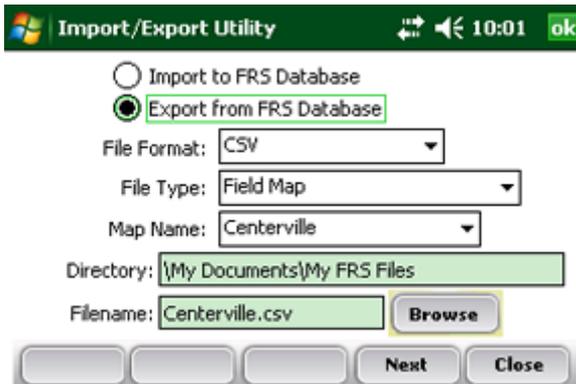


Figure 6-3: Import/Export Utility screen

4. Fill in the information on the Import/Export Utility screen. For more information about the elements on the screen, see the ***FRS Note Taking Field Reference Guide***. To find the map file you want to export, choose ***Browse***.
5. Tap ***Next*** (F4).

If you extracted a field map, the Export Map Data screen appears, showing the target path where the file will be saved. Select the option to ***Include previously exported data*** if you plan to export all data associated with this map. If you only want to export new data associated with the map, leave the option unselected.

After data has been exported to the handheld, it can be copied to the desktop using ActiveSync or Windows Mobile Device Center.

Refer to the ***FRS Note Taking Field Reference Guide*** for more details on exporting data.

Backup Log for Harvest Modules

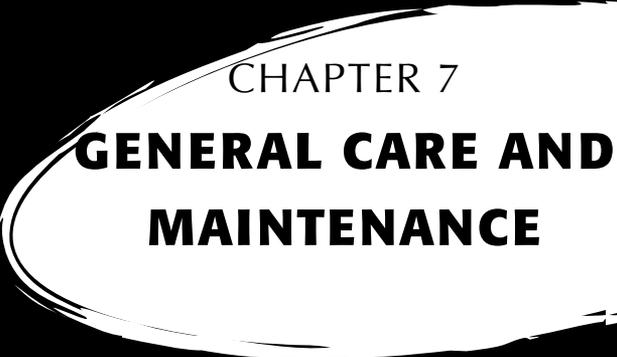
FRS software creates a backup log of data that has been collected from the harvester. This log file contains the date, time, range, row, plot weight, moisture, and test weight for each plot harvested. It also contains values used for moisture and test weight calibration, and Slope and Motion compensation, or Q value. The backup log file is found on the Allegro, see Figure 6-4.

Path: C_Drive\FRS\HarvestBackup

Each backup log references the same name as the field map used for harvest. For example, if the name of the field being harvested is Smith Farm, the name of the backup log would be Smith Farm_GHM.csv.

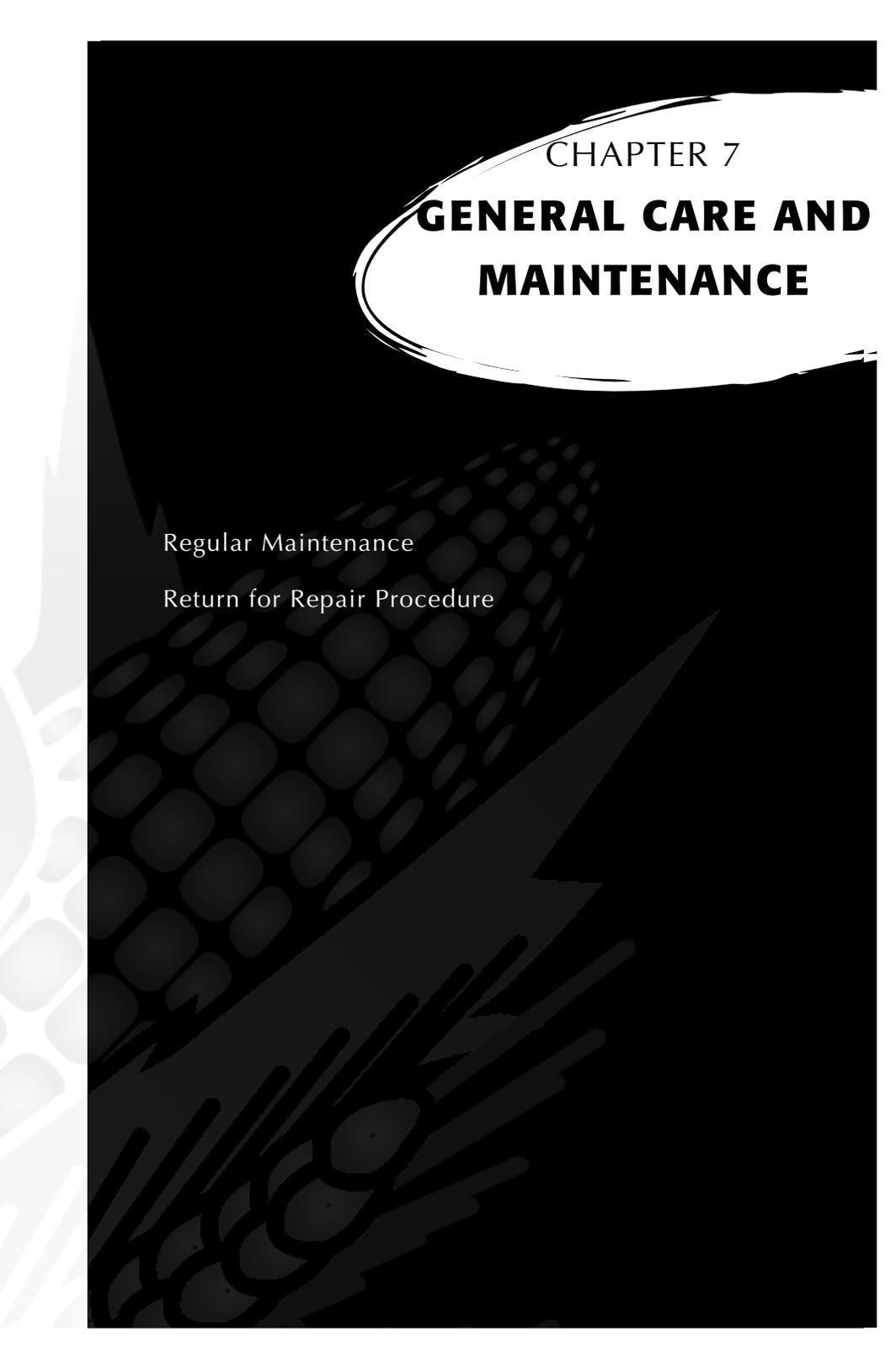
1	A	B	C	D	E	F	G	H	I	J	K	L	M
2	Date	Time	Range(D	Row(D2)	ID3	Weight	Moisture	TestV	WegZeroF	ZeroV	CurrentF	CurrentV	Temp
2	15/04/2008	16:20:42	1	1		2.49	6.72	0	3.9325	0		0	0
3	15/04/2008	16:20:56	2	1		2.52	6.82	0	3.9488	1.688	3.3274	1.334	28.9
4	15/04/2008	16:21:07	3	1		2.5	6.92	0	3.9488	1.688	3.318	1.329	28.9
5	15/04/2008	16:21:23	4	1		2.49	6.88	0	3.9488	1.688	3.323	1.333	28.5
6	15/04/2008	16:21:34	5	1		2.52	6.92	0	3.9488	1.688	3.323	1.331	28.5
7	15/04/2008	16:22:59	6	1		2.5	6.9	0	3.9488	1.688	3.3242	1.332	28.3
8	15/04/2008	16:23:38	7	1		2.49	6.92	0	3.9488	1.688	3.3238	1.333	28.3
9	15/04/2008	16:24:08	8	1		2.5	6.94	0	3.9488	1.688	3.3218	1.331	28.2
10	15/04/2008	16:24:22	9	1		2.52	6.92	0	3.9488	1.688	3.318	1.328	28.9
11	15/04/2008	16:28:08	10	1		2.49	6.88	0	3.9488	1.688	3.323	1.333	28.5
12	15/04/2008	16:28:26	10	2		2.49	6.92	0	3.9488	1.688	3.323	1.331	28.5
13	15/04/2008	16:28:40	9	2		2.5	6.9	0	3.9488	1.688	3.3242	1.332	28.3
14	15/04/2008	16:28:55	8	2		2.52	6.92	0	3.9488	1.688	3.3238	1.333	28.3
15	15/04/2008	16:30:01	7	2		2.5	6.94	0	3.9488	1.688	3.3218	1.331	28.2

Figure 6-4: Example of backup log file.



CHAPTER 7

GENERAL CARE AND MAINTENANCE



Regular Maintenance

Return for Repair Procedure

General Care and Maintenance

Generic Harvest Module Regular Maintenance

HarvestMaster products are built to be robust and will withstand most weather conditions. All of our products are environmentally sealed and built for outdoor use. However, there are some steps you can take that will increase the operational life of the system. The following tips will help you to have fewer problems and will ensure the maximum life out of your system.

Recommended Pre-Harvest Maintenance

We recommend starting your pre-harvest checklist at least two weeks before you plan to be in the field. In addition, we also recommend that when you are checking calibrations that you run several samples of grain with known weights and moistures through the system to assure accurate moisture and weight calibrations.

All Systems

- Clean the combine battery terminals to ensure a good power and good connection
- Inspect all cables for mice damage

- Make sure all cables are securely seated (“click” lock into place) and are not touching or interfering with the weigh bucket assembly
- If equipped with a pneumatic air system, check the filters and lubricator for contamination. Replace as necessary. Close the petcock valve on the air tank and charge the system up to 120 PSI. Check for air leaks. Operating pressure should be regulated to 50 PSI.
- Check the limit switches for proper function (adjust if needed)
- Check the actuator operation for each door assembly for normal operation. Replace or clean as needed.
- Ensure the weigh bucket or pan moves freely. Verify air hoses and cables are not interfering with the weigh pan.
- Check the actuators and slides for proper function and adjustment
- Run “DIAGNOSTIC” menu checks on the load cells, and moisture sensor as outlined in the Diagnostics section of this reference guide
- Check weight and moisture calibrations

Recommended Post-Harvest Maintenance

- Print setups and moisture curves. Save and file this information in an area where it can be found in future years if needed.

Chapter 7

- With about 120 PSI forced air, blow all chaff and broken kernels out of and from around the weigh bucket
- Avoid using water to clean in and around the weigh systems. If you use a sprayer washer to clean the combine, be sure to keep the water away from all sensors and cabling.
- If the system has pneumatic actuators (e.g. GrainGages), retract all the cylinder rams into the housing
- If mice have been a problem in the past, place mouse poison or traps in areas where mice might appear. Moth balls tend to help as well.
- If your Harvest Data System console is mounted outside of the cab (e.g. exposed to the elements), we recommend removing or covering the control box. It is best to store your system in a warm and dry environment.
- If the combine is not protected from the weather, cover any exposed cable ends (connectors) with plastic bags and secure tightly with twist-ties or rubber bands

Installation and Maintenance Tips

We suggest the following tips when installing and/or maintaining the Harvest Data System:

When using pneumatics:

- Install a three- to five-gallon reservoir air-tank. This tank must have a petcock type drain valve or an

electronically controlled drain valve to allow any water that accumulates inside the tank to be drained

- Install the Bosch Combo filter/regulator as close to the Generic Harvest Module as possible
- If areas of high humidity or when using a lubricated compressor, we recommend you install a Kaeser Model KOR-20 filter.

Return for Repair Procedure

In the event that your Harvest Data System needs repairs, contact a Juniper Systems Technical Service Representative for a Returned Materials Authorization (RMA) number.

Please have the following information ready when you call:

- Serial Number
- Model Number
- Name and Company/University/Agency
- Phone and Fax Numbers
- Clear description of problem
- Purchase Order Number and Billing Address

Under the Premium Support Agreement, HarvestMaster will ship you a replacement loaner Next Day Federal Express or UPS Red. To avoid any problems in the return procedure, complete the following steps:

1. Once you receive the loaner unit, fill out the shipping and RMA forms that were included with your loaner

Chapter 7

equipment. Include a description of the failure. The more information you can supply concerning the malfunction and the circumstances under which it occurred, the quicker our technicians can complete the repair.

2. Package your equipment in the same box (if the existing box is still good). Package the unit properly to avoid shipping damage.
3. Write the RMA# on the package you ship. Ship it Federal Express, Next Day Air Mail, or UPS Red.

Your equipment will be repaired and returned to you. After receiving your repaired equipment, you will be authorized a period in which to return the loaner unit before you will be billed for it. There is an annual service and support fee that allows you to have this service. Please call for detailed information and pricing.

APPENDIX

Appendix A: Warranty

Appendix B: Mounting Diagrams

Appendix C: Cable Wiring Diagrams for the
HM-800

Appendix D: Connector Wiring Diagrams for the
HM-800

Appendix E: FRS Update for Allegro CX

Appendix F: FRS Update for Laptop

Appendix A

Warranty

Limited Warranty

Hardware

All products manufactured by Juniper Systems, Inc. (Juniper Systems) when properly installed, calibrated, and operated in accordance with instruction manuals accompanying the hardware and used for the purpose for which the hardware was designed shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment.

In the event a defect in materials or workmanship is discovered and reported to Juniper Systems within the one-year period, Juniper Systems will, at its option, repair the defect or replace the defective product. Juniper Systems' obligation hereunder will be limited to such repair or replacement.

The customer shall have the responsibility to ship the defective equipment to Juniper Systems with all cost of shipment prepaid. After repair or replacement Juniper Systems will, at their own expense, ship the replacement or repaired item back to the customer using the same type of carrier.

Software

Software products that are designed by Juniper Systems for use with a hardware product and that are properly installed on that hardware product are warranted to the end user not to fail to execute their programming instructions due to defects in materials or workmanship for a period of one year from date of delivery.

If Juniper Systems receives notice of such defects during the one year warranty period, Juniper Systems shall, at its option, repair or replace the defective software media. Warranty is limited to repair or replacement of software media.

The warranties provided herein do not apply in the case of improper or inadequate maintenance or in the case of repair by any person not previously authorized in writing by Juniper Systems to do such maintenance or make such repairs.

These warranties likewise do not apply where the products have been operated outside the environmental specification of the product, where software products other than those specified by Juniper Systems have been used, or where attempts at software interface have been made by any person not previously authorized by HarvestMaster to perform such interfacing operations.

Disclaimer of Warranties

The warranties set forth herein are in lieu of all other warranties of Juniper Systems, whether written, oral or implied. Juniper Systems makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing, or usage of trade whether any of the foregoing warranties are either expressed or implied.

Juniper Systems specifically makes no warranties as to the suitability of its products for any particular application. Juniper Systems shall in no event be liable for special, incidental, or consequential damages in connection with or arising out of the furnishing, performance or use of any product covered by this agreement whether such claim is based upon warranty (express or implied), contract, strict liability, negligence or otherwise.

Updates or Modifications

Juniper Systems shall be under no obligation to update or modify its products except as herein noted to correct program errors. Furthermore, the customer agrees that all representations and warranties contained herein shall be immediately null and void in the event of any modification, alteration or change in or to any product affected by or on behalf of the customer except for a change made by Juniper Systems.

Removal of Serial Number

Removal of the Juniper Systems serial number label from an instrument will void any warranty on the said instrument. Juniper Systems will not repair or update an instrument and return it to an individual if the instrument is without the said serial number label.

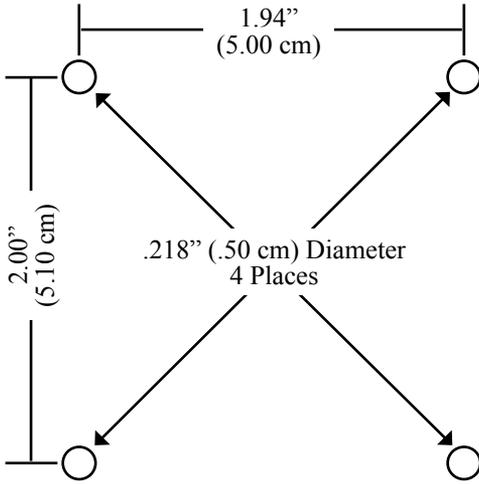
Extended Warranties

Juniper Systems offers a variety of warranty options to extend coverage beyond the standard warranty. You can contact Juniper Systems Customer Service Department for details at (435) 753-1881 (6 am - 5 pm MST, Mon-Fri).

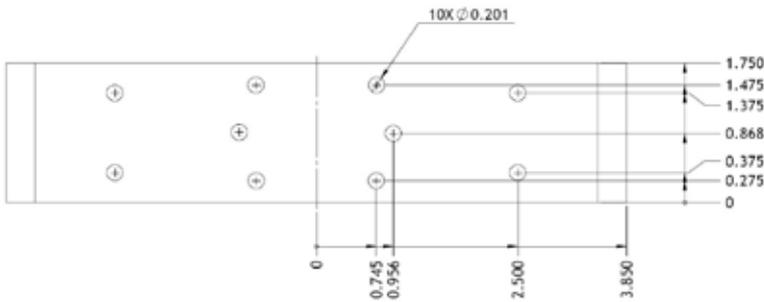
Appendix B

Mounting Diagrams

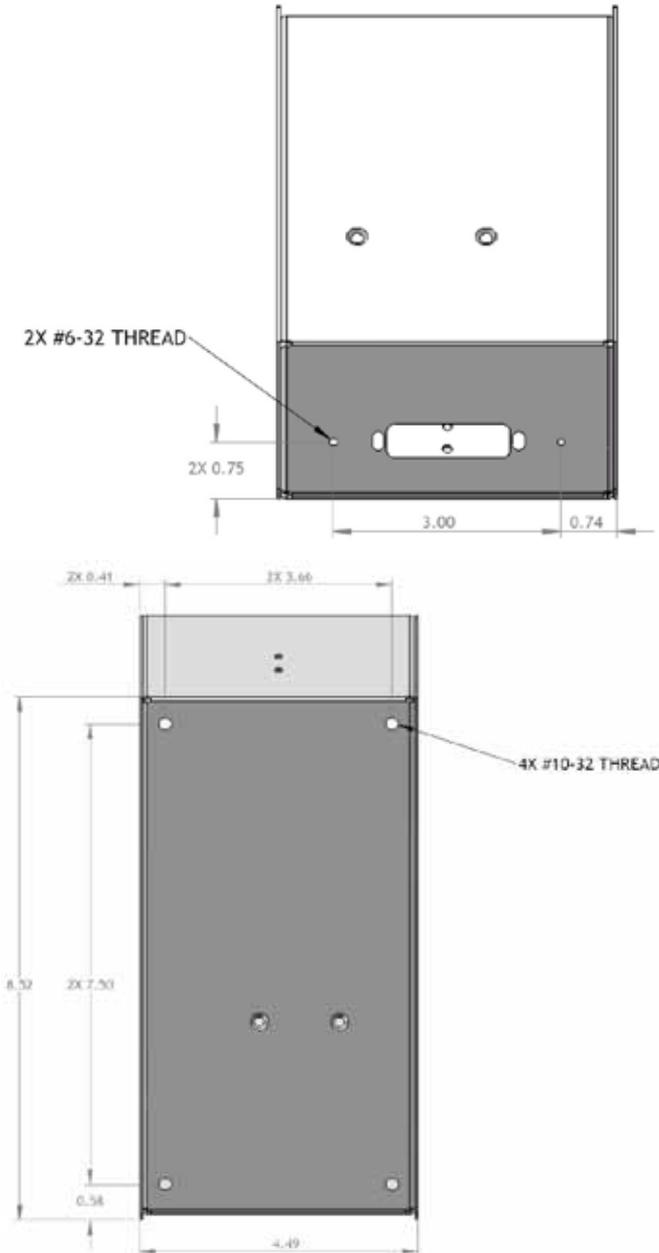
This diagram shows placement for mounting the Field Computer cradle.



Below is pictured the system console mounting diagram.

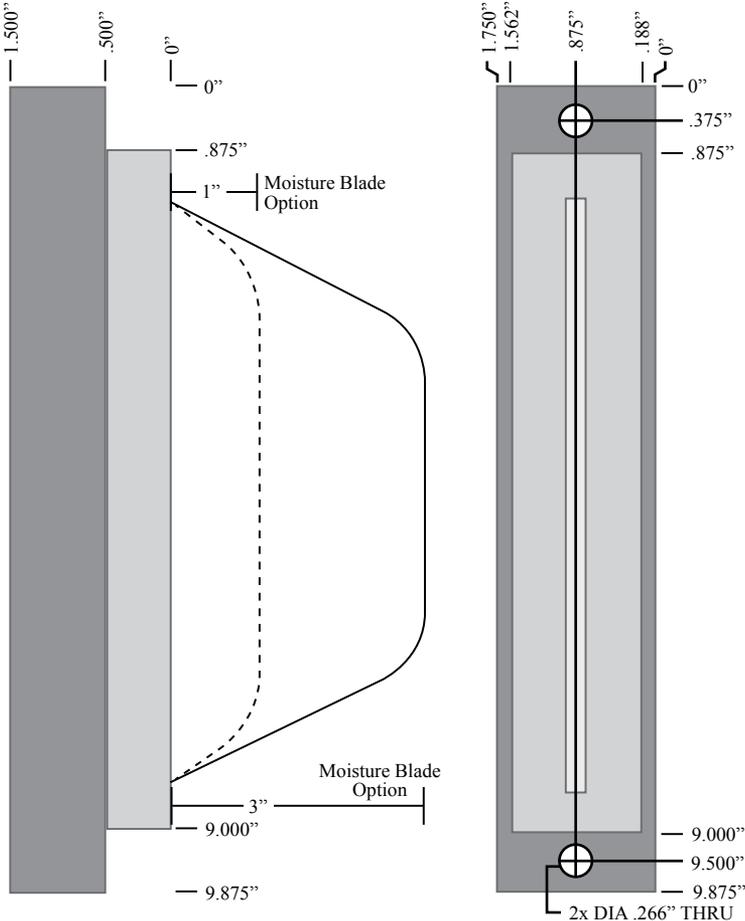


The next two diagrams are for mounting the printer.



Moisture Sensor Installation

There are three styles of moisture sensors: one inch, three inch, and four inch mini blade. After checking to see which moisture blade you have, refer to the following installation procedure that applies.



1" or 3" Moisture Blade

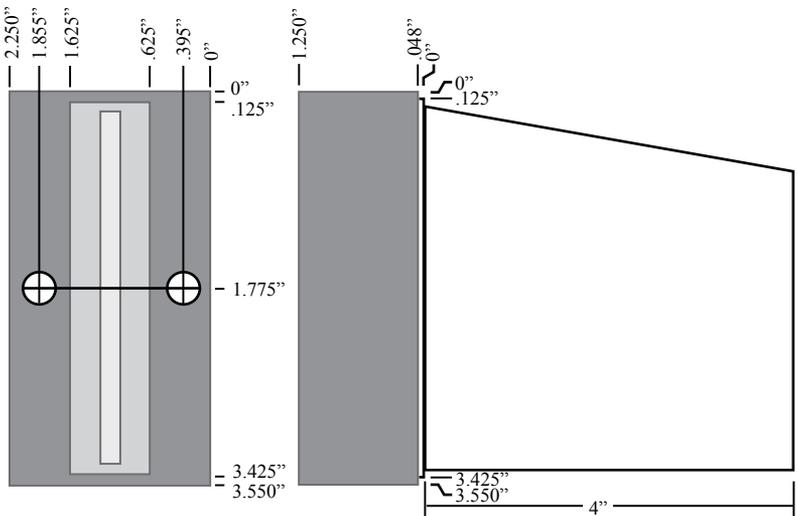
The one-inch blade configuration is identical to the three-inch blade configuration, only with the outer two inches of the blade cut off.

To install the one inch or three inch moisture sensor blade:

Place the sensor into the precut hole on the weigh bucket.

If your bucket manufacturer did not provide a pre-cut slot for the moisture sensor blade, you will need to take the weigh bucket to a machine shop to have the slot cut. The moisture blade should be mounted in a moisture test chamber.

Align the sensor's position and tighten the two screws in the holes.



4" Mini-Moisture Blade

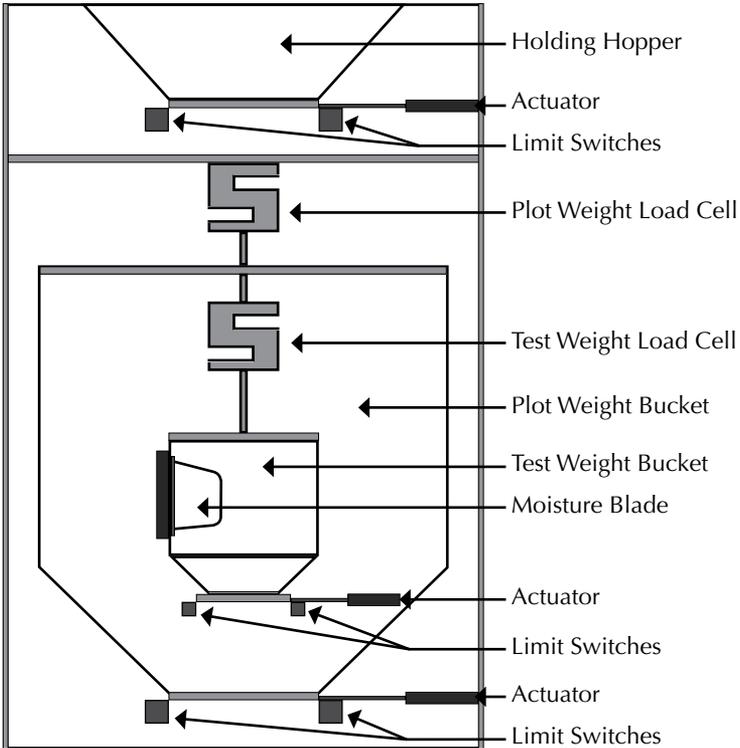
To install the four in style mini moisture sensor:

Cut a rectangular slot in the side of the test chamber. The .048" shoulder of the moisture sensor fit snug against the cut edges.

Drill two .165" DIA mounting holes in the appropriate positions. Insert the supplied clinch nuts.

Appendix

A basic Test-Harvest System. This installation includes a test-chamber load cell as well as a plot-weight load cell; therefore, the assembly includes a test chamber. A moisture sensor is installed in the test chamber in this example.



Appendix C

Cable Wiring Diagrams for the HM-800

Cable Connections for HM-800

Within the HM-800 there are several components. Figure C-1 shows the components wired on the stand.



Figure C-1: Front view of HM-800 components

Figure C-2 shows the cable connections from the HM-800 System Console and modules to other components.

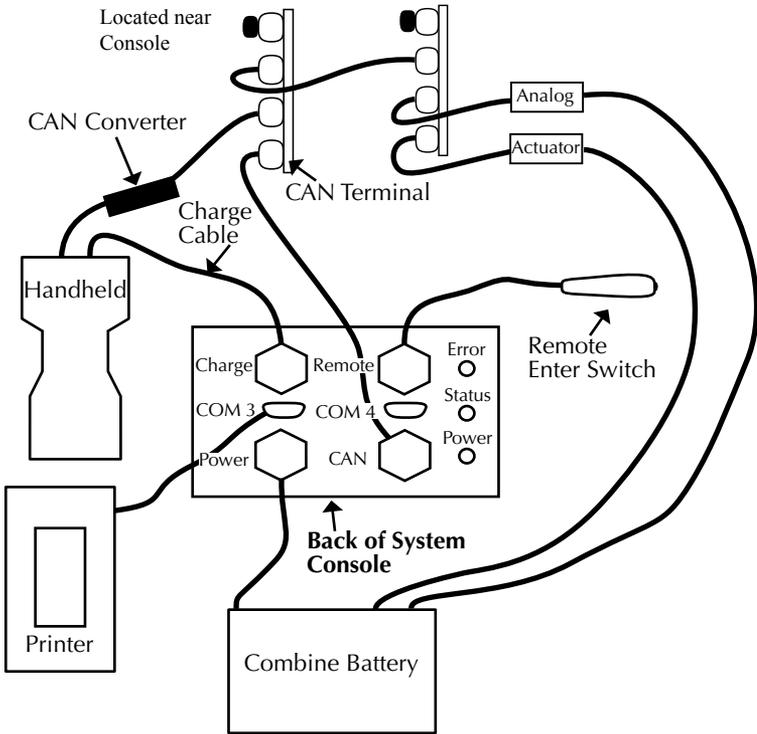


Figure C-2: Cable connections for the HM-800

HM-800 Limit Switch Wire Diagram

Limit Switches must be wired correctly in order to notify the FRS application when a bucket or door has completed its function.

In the HM-800 system the signal wire must be wired to the “normally open” terminal of the limit switch. The limit switch signal is pulled high until a switch is closed. When a

Appendix

limit switch closes the input is grounded.

Refer to the following chart for proper connection of the limit switch and the corresponding wire.

<i>Actuator Module</i>	<i>Wire Color</i>	<i>Limit Switch Connection</i>
LS1	White	Plot Open (Normally Open)
	Green	Common
	Red	Plot Closed (Normally Open)
	Black	Common
LS2	White	Test Open (Normally Open)
	Green	Common
	Red	Test Closed (Normally Open)
	Black	Common
LS3	White	Hopper Open (Normally Open)
	Green	Common
	Red	Hopper Closed (Normally Open)
	Black	Common
LS4	White	Aux Open
	Green	Common
	Red	Aux Closed
	Black	Common

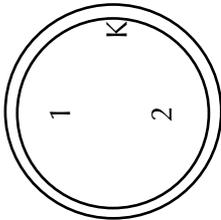
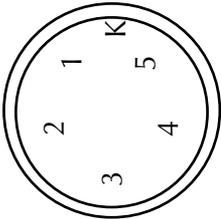
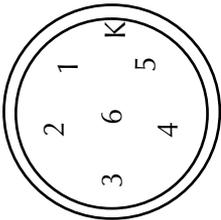
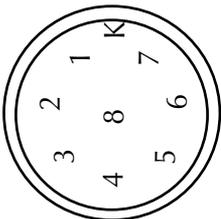
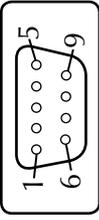
For all Pnuematic, Electric, and Hydraulic Actuators

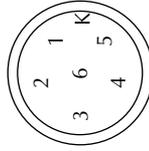
Actuator Connection	Red	Bucket Open
	Black	Bucket Close

Windshield Wiper

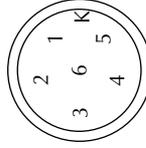
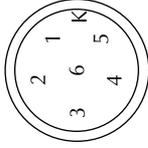
Actuator Connectionn	Red	Low Terminal
	Black	Park Terminal

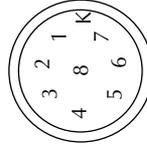
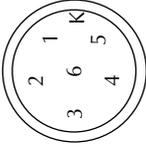
Appendix D: Connector Wiring Diagrams for the HM-800

<i>Analog Module</i>	<i>GHM</i>	<i>Pin</i>	<i>Connection</i>	<i>Description</i>
	 <p>2 pin</p>			
	 <p>5 pin</p>			
	 <p>6 pin</p>			
	 <p>8 pin</p>			
	 <p>9 pin</p>			
Load A <i>6 pin</i>		<p>1 2 3 4 5 6 N/C N/C</p>	<p>Green N/C Red White Black Shield Brown Blue</p>	<p>Excite N/C Signal + Signal - Excite Gnd Chassis Gnd N/C N/C</p>



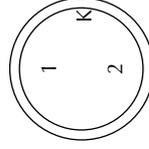
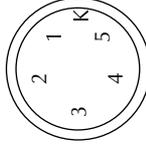
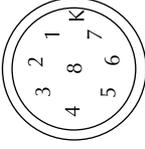
Analog Module	GHM	Pin	Connection	Description
Load B <i>6 pin</i>	Test Load Cell	1	Green	Excite
		2	N/C	N/C
		3	Red	Signal +
		4	White	Signal -
		5	Black	Excite Gnd
		6	Shield	Chassis Gnd
Load C <i>6 pin</i>	Load Cell (Third load cell in multiple load cell applications)	N/C	Brown	N/C
		N/C	Blue	N/C
		1	Green	Excite
		2	N/C	N/C
		3	Red	Signal +
		4	White	Signal -
5	Black	Excite Gnd		
6	Shield	Chassis Gnd		
N/C		N/C	Brown	N/C
N/C		N/C	Blue	N/C

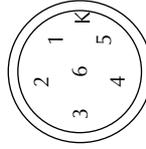
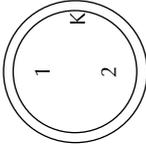




<i>Analog Module</i>	<i>GHM</i>	<i>Pin</i>	<i>Connection</i>	<i>Description</i>
Load D <i>6 pin</i>		1	Green	Excite
		2	N/C	N/C
		3	Red	Signal +
		4	White	Signal -
		5	Black	Excite Gnd
		6	Shield	Chassis Gnd
		N/C	Brown	N/C
		N/C	Blue	N/C
CAN <i>8 pin</i>		1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN -
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C

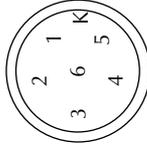
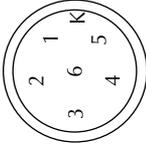
Analog Module	GHM	Pin	Connection	Description
CAN-DIAG <i>8 pin</i>	CAN	1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN -
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C
Moisture <i>5 pin</i>	Moisture EM Sens	1	Red	Excite
		2	Black	Ground
		3	Green	Signal +
		4	White	Signal -
		5	Shield	Ground
Power <i>2 pin</i>	Power	1	Black	Ground
		2	Red	+12 V

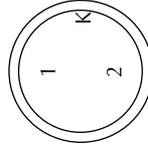
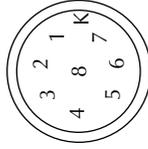
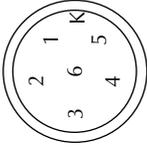




Actuator Module	GHM	Pin	Connection	Description
Act 1 2 pin	Plot Act	1	Red	Power
		2	Black	Ground
Act 2 2 pin	Test Act	1	Red	Power
		2	Black	Ground
ACT 3 2 pin	Hopper Act	1	Red	Power
		2	Black	Ground
Act 4 2 pin	Aux Act	1	Red	Power
		2	Black	Ground
LSW 1 6 pin	Plot LSW	1	N/C	N/C
		2	Green	Ground
		3	White	Plot Open (Normally Open)
		4	N/C	N/C
		5	Black	Ground
		6	Red	Plot Closed (Normally Open)

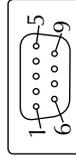
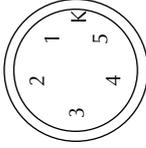
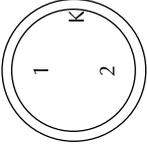
Actuator Module	GHM	Pin	Connection	Description
LSW 2 <i>6 pin</i>	Test LSW	1	N/C	N/C
		2	Green	Ground
		3	White	Test Open (Normally Open)
		4	N/C	N/C
		5	Black	Ground
		6	Red	Test Closed (Normally Open)
LSW 3 <i>6 pin</i>	Hopper LSW	1	N/C	N/C
		2	Green	Ground
		3	White	Hopper Open (Normally Open)
		4	N/C	N/C
		5	Black	Ground
		6	Red	Hopper Closed (Normally Open)



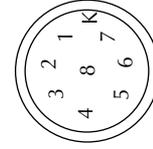
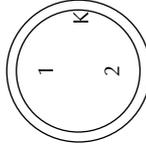
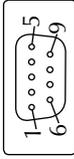


Actuator Module	GHM	Pin	Connection	Description
LSW 4 6 pin	N/A	1	N/C	N/C
		2	Green	Ground
		3	White	Aux Open
		4	N/C	N/C
		5	Black	Ground
		6	Red	Aux Open
CAN 8 pin	CAN (patch Cable)	1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN -
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C
Power 2 pin	Power	1	Black	Ground
		2	Red	+12 V

<i>System Console</i>	<i>GHM</i>	<i>Pin</i>	<i>Connection</i>	<i>Description</i>	
Allegro Power <i>2 pin</i>		1	Stria	+12 V	
		2	Black	Ground	
Remote <i>5 pin</i>		1	Black	Input	
		2	Green	Ground	
		3	Red	Power	
		4	N/C	N/C	
		5	N/C	N/C	
Com 3		1	N/C	N/C	
		2	RXD	Receive Data	
		3	TXD	Transmit Data	
		4	DTR	Data Terminal Ready	
	Printer		5	GND	Ground
			6	DSR	Data Set Ready
			7	RTS	Request to Send
			8	CTS	Clear to Send
			9	N/C	N/C



System Console	GHM	Pin	Connection	Description
Com 4		1	N/C	N/C
		2	RXD	Receive Data
		3	TXD	Transmit Data
		4	DTR	Data Terminal Ready
		5	GND	Ground
		6	N/C	N/C
		7	RTS	Request to Send
		8	CTS	Clear to Send
		9	RI	Ringing In
Power <i>2 pin</i>	Power	1	Black	Ground
		2	Red	+12 V
CAN <i>8 pin</i>	CAN	1	Red	CAN Power
		2	Yellow	CAN +
		3	Black	CAN Gnd
		4	Green	CAN -
		5	N/C	N/C
		6	N/C	N/C
		7	N/C	N/C
		8	N/C	N/C



Appendix E

FRS Update for Allegro CX

Important notes

The process of updating FRS will erase all data associated with the current installation of FRS on the handheld. Please review the items in this section to understand which data is at risk and be sure to make backup copies so that you can restore files that are critical to your FRS setup. Please review the RELEASE NOTES associated with the latest software version located on the HarvestMaster website. These notes will recommend optimal settings and instructions to maximize the efficiency of your Harvest Data System.

This update will:

- Remove all existing versions of FRS stored on your handheld.
- Remove the FRS database on the handheld. This includes field maps, customized trait list, trait templates, and other associated data. This data needs to be exported and saved so that they can be imported back into FRS after the new software is installed.
- Erase special harvest script files (GHM, Kincaid air diverter, Wintersteiger subsampler, etc.). These instructions will guide you through how to either download the latest script file, or save your original

script files and import them into the newest version of FRS.

- Erase the harvest calibrations and handheld settings, including load cell coefficients, chamber volumes, actuator settings, level detect sensor settings, timers, and moisture curves. In order to avoid having to recalibrate after the update, be sure to record the current harvest calibrations and handheld settings so that they can be entered in FRS after the update.

Requirements

- Original FRS Note Taking serial number and registration codes found on the back of CD case or laminated card sent at the time of purchase
- Allegro CX Field PC
- Microsoft ActiveSync (for Windows XP) or Windows Mobile Device Center (for Windows Vista)
- Either a USB Power Dock (recommended)

Saving your original script file

There may be an updated version of your script file. Please consult our website to determine if this is the case. If so, then you will not need to worry about saving your original script file.

1. Go to **My Computer > C_Drive > FRS** on handheld.
2. Go into your Harvest Module's folder.

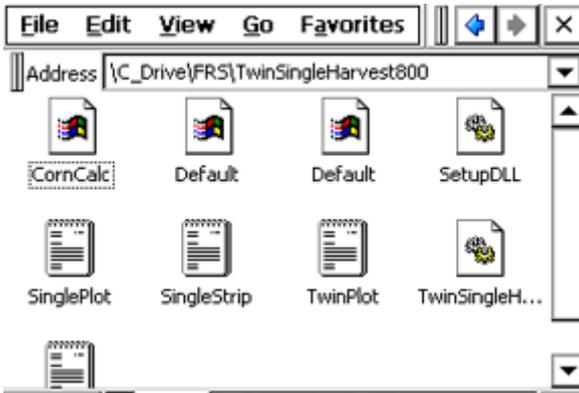


Figure E-1: Select module folder

3. Hold **Ctrl** on the handheld keyboard and select the appropriate text files by tapping once on each file. Text files are represented by an icon of a notebook.
4. Click **Edit**; click **Copy**
5. Go back to **C:_Drive** and go into **C_MyDocs**.
6. Click **Edit**; click **Paste**.

Removing and Installing Latest Version of FRS and Related Firmware

Removing FRS and Firmware on Handheld

1. Tap on **Start > Settings > Control Panel**.



Figure E-2: Select Control Panel

2. Scroll down to **Remove Programs**. Press **ENTER**.



Figure E-3: Select Remove Programs

3. Choose to remove the Harvest Module.

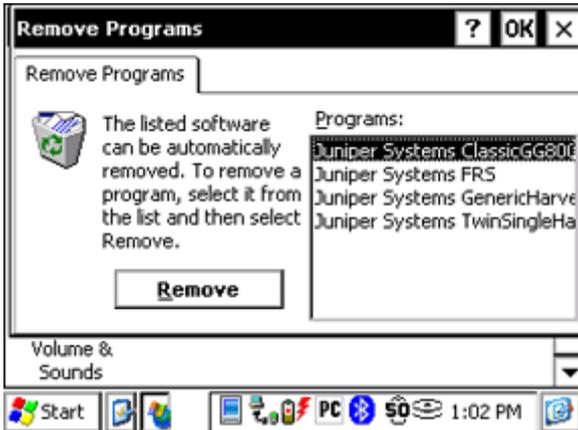


Figure E-4: Select program to remove

4. Confirm your intention to remove the program.
5. Choose to remove **FRS Notes**.
6. Confirm your intention to remove the program.
7. Choose to remove all application data.
8. Go to **My Computer** on handheld's desktop.
9. Open **C_Drive**.

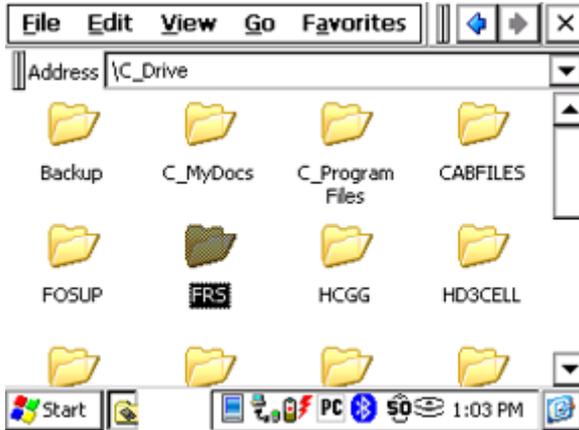


Figure E-5: Delete FRS folder

10. Delete **FRS** folder.
11. Choose **Yes** to whatever questions it asks about removing files.

Set handheld to factory defaults

This action will remove any other programs you have loaded onto the handheld

1. Select **Start > Programs > Utilities > Set Factory Defaults**.
2. Click **Yes**.
3. Recalibrate the touch screen.
4. Enter the last known battery charge.

Downloading and Installing Updated FRS

1. Visit <http://www.harvestmaster.com/updates>.
2. Download the FRS Note Taking EXE file, making sure you select the correct version of the software for your handheld OS (ex. CX vs. MX).
3. Make an Activesync or Mobile Device Center connection between your handheld and PC.
4. Run FRS Note Taking setup on PC.
5. Choose installation location on PC.
6. Choose **Yes** to allow program to install in default location on handheld.
7. Give it a minute or two to download onto your handheld.
8. Run FRS on handheld.
9. Enter name and previously obtained serial number, and registration key.

Downloading and Installing Harvest Module

1. Visit <http://www.harvestmaster.com/updates>.
2. Download CAB file associated with your harvest module and correct handheld OS (example: 400 vs. 800 and CX vs. MX).
3. Make an Activesync or Mobile Device Center connection between your handheld and PC.

4. Click Explore (XP) / File Management (Vista).
5. Click and drag the CAB file from the PC to the handheld to a location where you can find later with File Explorer.
6. Allow file to convert to handheld format.
7. Run file on handheld.
8. Tap **OK** to allow program to install in default location on handheld.

HM-800 Users:

- For HM-800 Systems, the firmware must be manually updated using a utility on the handheld. Follow the steps below to complete the HM-800 update.
- Using both the battery with a full charge and the external power cord is ideal before updating the firmware. Also make sure the Auto suspend is disabled (**Start>Settings>Control Panel>Power>Schemes**). If you do not have an external power cord, you can use the Console charge cord. Failure to power the Allegro during the full firmware update process could lock the Console module.

Updating HM-800 Firmware

1. Connect handheld to Harvest Data System.
2. Open **My Computer> C_Drive> FRS> Firmware**.
3. Run **HM-800 Updater**.



Figure E-6: Select HM-800 Updater

4. Choose the file that contains the updated information.

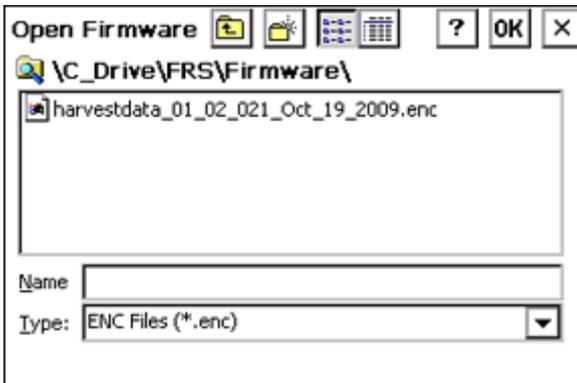


Figure E-7: Select .enc file

5. Select the module you wish to update.

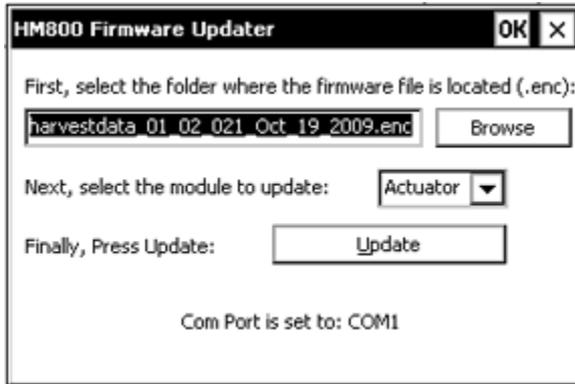


Figure E-8: Select module to update

6. Click on **Update** and it will show the current firmware version installed and give you the option of continuing.
7. If the versions do not match and the current firmware version is older than the new firmware version, select **Yes**.

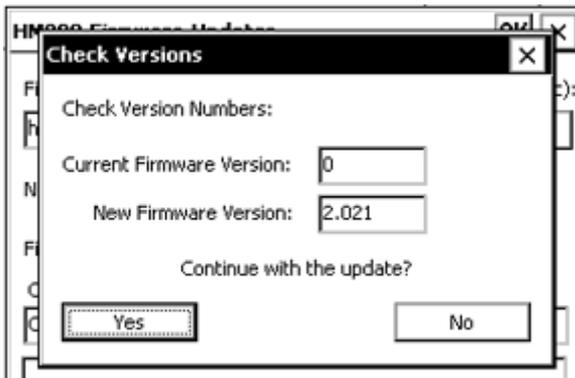


Figure E-9: Continue with pdate

Appendix

8. Continue the firmware update for all HM-800 modules.

When the firmware update is complete, open FRS and type in your calibration settings that were previously recorded. If you never changed the transition timers on the actuators, we recommend leaving them at default to speed up operation. Verify the calibration and operation of the system. You will also need to import any data that you exported earlier such as maps, customized trait list, trait templates, existing data, etc. Refer to chapter 7 of the FRS Field Reference Guide: Note Taking manual for further instructions on importing and exporting files.

After installing the software and getting everything set up, go to **Start > Programs > Utilities > Save System**. This will permanently burn FRS to the permanent storage and will not lose the program if the battery runs dead.

Replacing the original script files

If there are no updated script files specified in the release notes, you can now copy/paste the original script files from the storage folder into the new harvest module folder .

1. Go to **My Computer > C_Drive > C_MyDocs**.
2. Hold **Ctrl** on the handheld's keyboard and click all the text files there.
3. Click **Edit**; click **Cut**.
4. Go into **C_Drive > FRS**.
5. Go into your Harvest Module's folder.
6. Click **Edit**; click **Paste** and answer **yes** when prompted.

If there are updated script files, download them from the website and paste them into your harvest module folder as previously instructed from steps five to seven.

Updating Datalink for FRS

1. First you will need to uninstall the original version of Datalink for FRS off of your PC.
2. After uninstalling the original Datalink for FRS, visit <http://www.harvestmaster.com/updates> and download the latest version of Datalink for FRS.
3. Run and install this latest version and your Datalink for FRS will be updated and compatible with the latest Datalink for FRS version.

Appendix F

FRS Update for Laptop



Important notes

The process of updating FRS will erase all data associated with the current installation of FRS on the laptop. Please review the items in this section to understand which data is at risk and be sure to make backup copies so that you can restore files that are critical to your FRS setup. Please review the RELEASE NOTES associated with the latest software version located on the HarvestMaster website. These notes will recommend optimal settings and instructions to maximize the efficiency of your Harvest Data System.

This update will:

- Remove all existing versions of FRS stored on your laptop.
- Remove the FRS database on the laptop. This includes field maps, customized trait list, trait templates and other associated data. This data need to be exported and saved so that they can be imported back into FRS after the new software is installed.
- Erase special harvest script files (GHM, Kincaid air diverter, Wintersteiger subsampler, etc.). These instructions will guide you through how to either download the latest script file, or save your original

script files and import them into the newest version of FRS.

- Erase the harvest calibrations and laptop settings, including load cell coefficients, chamber volumes, actuator settings, level detect sensor settings, timers, and moisture curves. In order to avoid having to recalibrate after the update, be sure to record the current harvest calibrations and handheld settings so that they can be entered in FRS after the update.

Requirements

- Original FRS Note Taking serial number and registration codes at the time of purchase
- Laptop PC running Windows XP, Vista or 7 (minimum resolution of 1280 x 1024)
- Full administration rights to install software on Laptop (contact your network administrator if you do not have administration rights)
- Microsoft ActiveSync (for Windows XP) or Windows Mobile Device Center (for Windows Vista)

Saving your original script file

1. Select ***Start Menu>Programs>Juniper Systems>FRS>Harvest Module Folder.***
2. Copy the appropriate text files from this folder and paste into a folder outside of the FRS program.

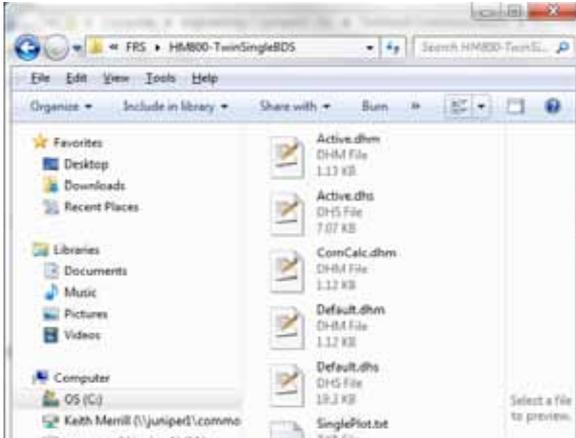


Figure F-1: Harvest Module Script Files'

Removing and Installing Latest Version of FRS and Related Firmware

Removing FRS and Firmware on Laptop.

1. Select **Start Menu > Programs > Juniper Systems > FRS > Uninstall**.
2. When uninstall is selected, you will be prompted to confirm your selection.
3. Select **Uninstall** to begin the process.

Loading updated version of FRS laptop.

1. Visit <http://www.harvestmaster.com/HarvestMaster/support/Downloads/FRS-Suite>.
2. Select FRS version for Laptop.

3. Select your harvest system type (HCGG, CGG, GHM).
4. Select MAIN SOFTWARE (Note Taking) and download this first.
5. You will now be prompted to RUN the software and it will begin installing.
6. You will then be prompted to choose components that you want to install with the program. Default is all checked.
7. Select **Next**, and you may choose an install location, but default location is automatic. Click **Install**.
8. Once installation is complete, you should see an FRS icon on your desktop.

Loading update Harvest Module software

1. Return to the website and download the appropriate Harvest Module for your application.
2. Once, downloaded, run the install software and follow the same prompts as the note-taking software.

HM-800 Users: Firmware Update

- The firmware must be updated manually using a utility that was installed with the software. Follow the steps below to complete the HM-800 Firmware update.
- It is critical that the laptop's battery is fully charged and the external power cord is connected before updating firmware. If a power failure occurs to the laptop during

Appendix

the firmware update process, the system console will become locked.

1. Connect laptop to Harvest Data System.
2. Select **Start Menu >Programs >Juniper Systems >FRS>Data Folder >Firmware.**
3. Select the Firmware Utility.

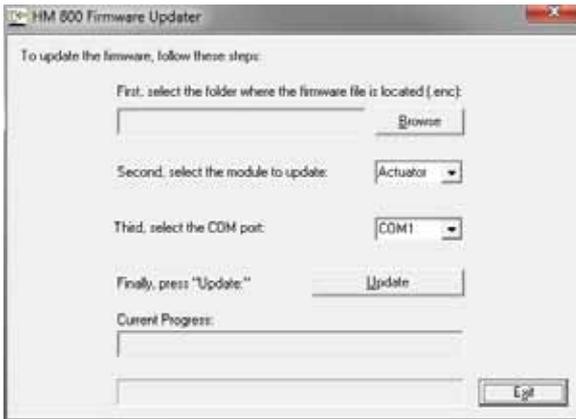


Figure F-2: HM Update screen

4. Select **Browse**, and then select the ENC. file from the window.
5. Select the module to update.
6. Select your COM port. You may have to configure your laptops com port settings.
7. Select **UPDATE**.

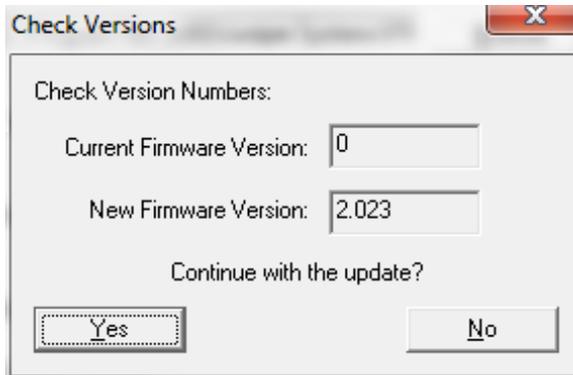


Figure F-3: Check Version screen

8. The Firmware updater will check the current versions and prompt you to continue with update. Select YES to load current firmware.
9. Continue update on all HM-800 modules on your system.

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